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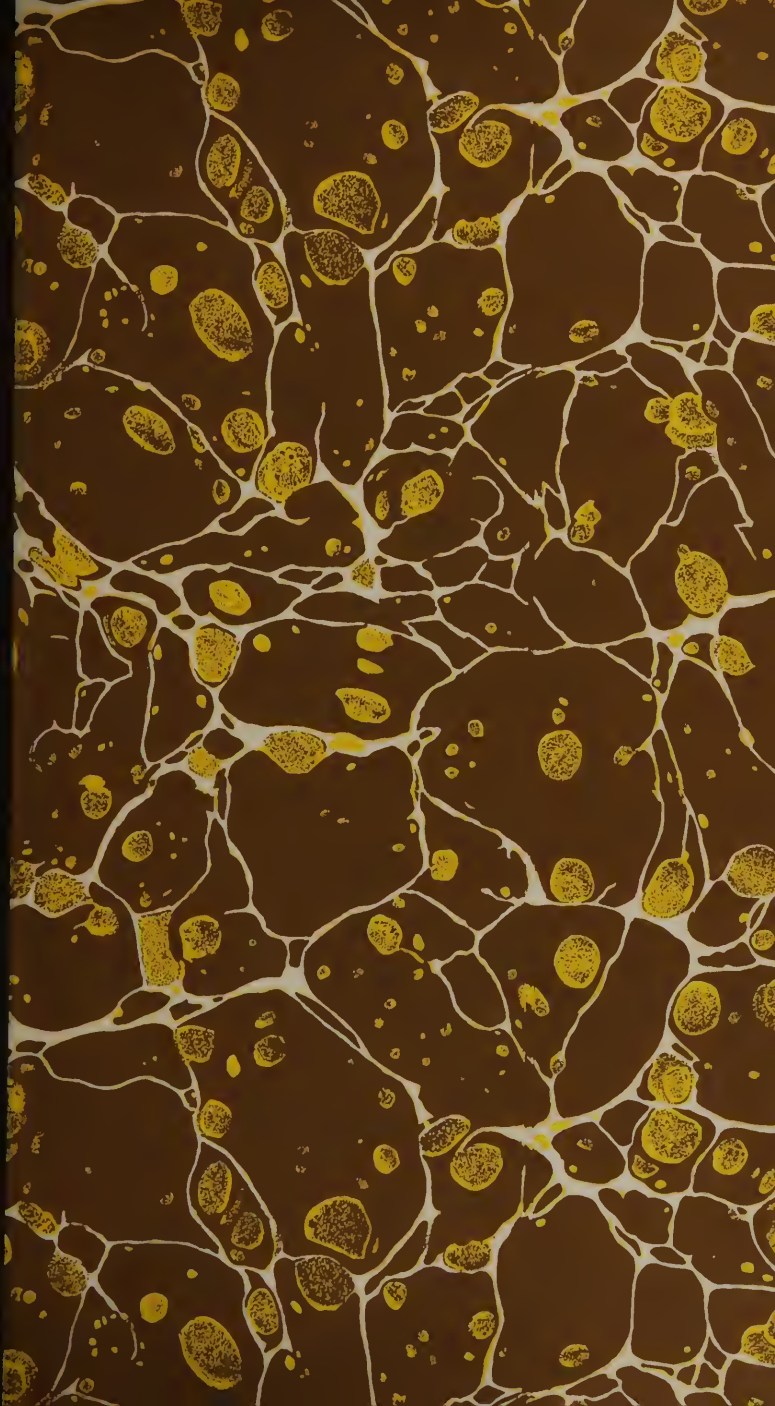


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*Robert* OF *Dunbar*

S U R G E R Y.

*Root* BY *Dunbar*

B E N J A M I N B E L L,

MEMBER OF THE ROYAL COLLEGES OF SURGEONS OF  
IRELAND AND EDINBURGH,  
ONE OF THE SURGEONS TO THE ROYAL INFIRMARY, AND  
FELLOW OF THE ROYAL SOCIETY OF EDINBURGH.

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VOLUME III.

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THE FIRST AMERICAN EDITION, CORRECTED.



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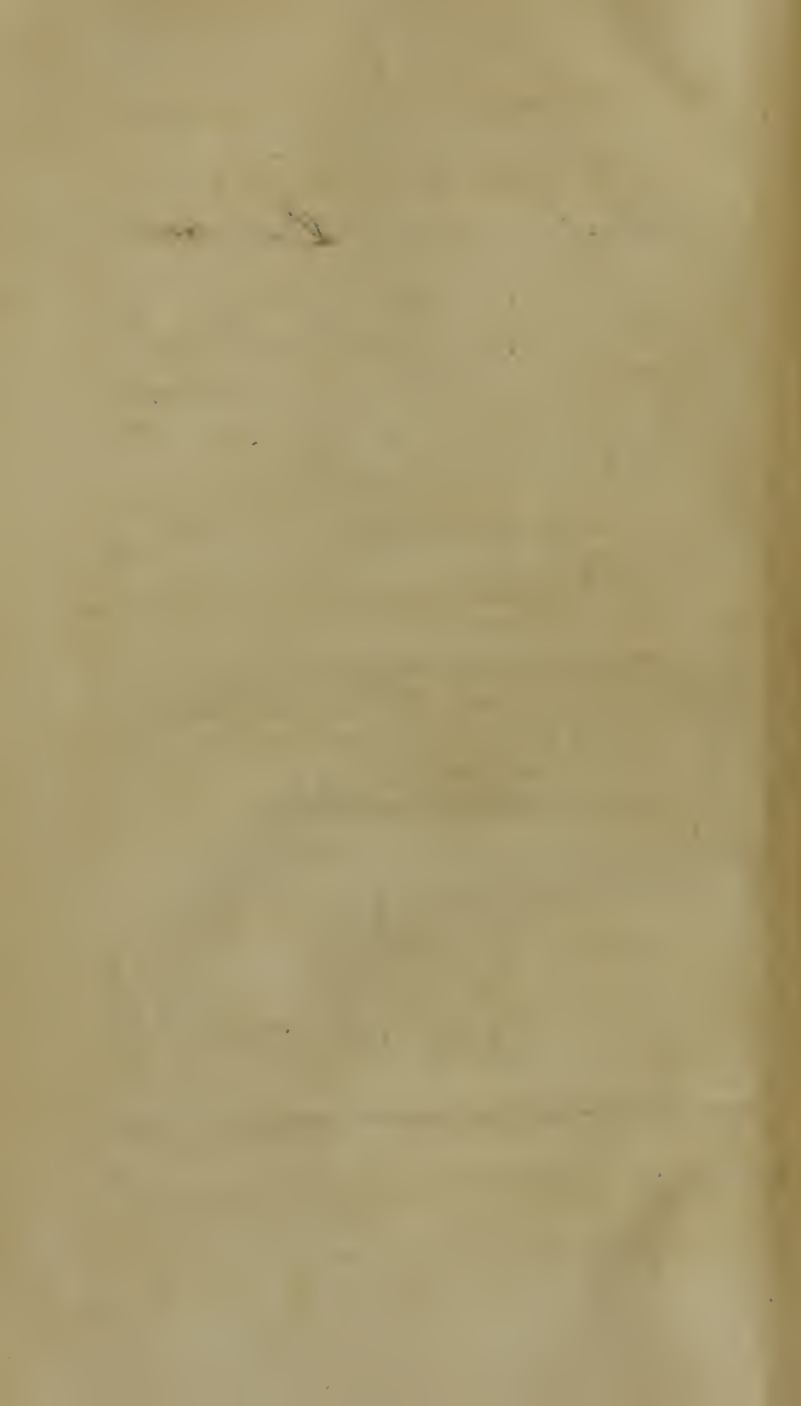
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A T R E A T I S E  
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C H A P T E R X X V I I .

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S E C T I O N X I X .

*Additional Remarks on Diseases of the Eyes.*

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I N the last volume of this work, I treated so fully of the diseases of the eyes, that it was not my intention to say any thing farther upon them : But since the publication of that volume, a foreign oculist, Mr. Jean François Pellier, having appeared in this country, where he has already acquired much reputation, I consider it as a necessary addition to the chapter on these diseases, to communicate such parts of Mr. Pellier's practice as appear to be of importance. Possessing the advantages of a liberal education, a sound judgment, and much experience, Mr.

Pellier has been enabled to suggest improvements in the treatment of almost every disease to which the eyes are liable ; and an uncommon degree of steadiness, conjoined to a quick eye-sight, give him a command of himself and a facility of operating which is not often attained. I think it proper likewise to remark, that Mr. Pellier communicated his knowledge of the diseases of the eyes in the most candid manner ; which puts it in my power to lay his observations before the Public, he having given me permission to do so.

While, by giving an early account of material improvements, I thus acquit myself of an obligation to the Public, I at the same time embrace, with much satisfaction, the opportunity which it affords of announcing the merit of an operator, who, although a stranger, and as yet not much known in this country, is perhaps one of the best oculists now in Europe.

In the first place, I shall mention what I have learned of Mr. Pellier's practice ; and shall then offer such remarks as occur to me upon it.

On the subject of the cataract his observations are particularly valuable. By attentive examination he can almost in every instance say whether a cataract is hard, somewhat soft, or altogether fluid ; and as his method of operating varies according to these circumstances, it is of importance to be able to determine *a priori* with regard to them. He can also ascertain whether a cataract is of a large or small size ; by which he is often directed in the different steps of the operation.

I know that these are circumstances which practitioners in general consider it as impossible to judge of with any degree of precision, particularly with respect to the consistence of cataracts ; and I must acknowledge, that I was clearly of this opinion, till of late that I was convinced of the contrary, not by Mr. Pellier's assertion alone, but by different proofs of the fact. I assisted Mr. Pellier in different cases where  
the

the cataract was extracted : in all of them he previously foretold the consistence and size of the cataract with perfect confidence ; and in every instance his prognosis was precise and accurate. I am credibly informed, too, that this happened with other practitioners in whose presence he operated in different parts of this country.

Mr. Pellier's definition of a cataract is, That it is a morbid affection attended with different degrees of opacity either in the lens itself ; in the small quantity of fluid with which the lens is surrounded ; or in the capsule which contains it.

He distinguishes several varieties of cataract, which in practice ought to be kept in view.

The three principal varieties which he mentions are the true or curable cataract ; the mixed or doubtful kind ; and the false or incurable.

1. The curable, or what he terms the true cataract, is known by the pupil retaining its natural power of contracting and dilating in full perfection, while the patient is at the same time able to distinguish the light of a candle, or of any other luminous body, and even certain bright colours, such as red, green, &c.

2. The mixed or doubtful cataract is attended with a weak feeble contraction and dilation of the pupil, and the patient can scarcely distinguish light from darkness. Along with an opacity of the crystalline, this is supposed to be attended with an affection of the retina, or of some other part of the eye.

3. In the false or incurable cataract, along with an opaque state of the lens, there is evidently a diseased state of the pupil, which remains always immovable to whatever degree of light it may be exposed, at the same time that the patient does not distinguish between the most brilliant light and perfect darkness.

Cataracts may be either simple or compound, or they may be complicated with other affections.

1. A simple cataract is a mere opacity of the crystalline lens, all the other parts of the eye remaining perfectly sound.

2. A cataract is said to be of a compound nature, when blindness is produced by an opaque state of the body of the lens, of the liquor which surrounds it, and of the capsule.

3. The disease is considered as complex, when it is conjoined with other affections of the internal parts of the eye ; the most frequent of which is an amaurosis.

It is not unfrequently, too, attended with a dissolution of the vitreous humour, and sometimes with an opacity of it. This variety of the disease is for the most part produced by violent inflammation. It is easily distinguished by those accustomed to an attentive examination of the eye ; and it is particularly necessary for operators to be well acquainted with it ; for no operation, neither extraction nor depression, should be ever advised for it. The operation has never in any instance of this species of cataract been known to succeed ; and for the most part, Mr. Pellier observes, it is productive of very dreadful pain, and the most violent degree of inflammation that he ever met with. In general, too, the pain and inflammation thus induced remain fixed and permanent, without yielding in any degree to the remedies employed for it.

Cataracts are sometimes attended, too, with an imperforated iris ; in which case, as no light can pass to the bottom of the eye, there is no degree of vision whatever ; and at other times they are complicated with adhesions, either to the iris, or to the capsule of the vitreous humor. Preternatural adhesions of the lens to the capsule of the vitreous humor can scarcely be distinguished by the eye ; but they are very commonly met with where the disease has been originally produced by, or attended with, much inflammation ; and they always render the operations of extraction and couching difficult. It is this kind of adhesion, Mr. Pellier imagines, which prevents the operation of couching from succeeding so frequently as it otherwise might do ; for when it takes place in any degree, the  
cataract

cataract, he supposes, will always rise again on the needle being removed from it.

In forming an opinion of cataracts from the seat of the disease, there are different circumstances which require attention.

1. It often happens, as we have already remarked, that the lens only is affected. This variety of the disease is most frequent, Mr. Pellier observes, in adults, and especially in old age.

2. When the opacity is seated in the capsule of the lens, if the anterior part of it only is diseased, it appears to be remarkably white, and to be placed very contiguous to the iris; while, on the contrary, if the posterior part of it only is affected, it is commonly of a grey colour, and the opacity appears to be deeply seated.

It sometimes happens, both after the operation of extraction and couching, that in the course of ten or twelve days, the capsule of the lens, which at first was perfectly sound, becomes quite opaque. This variety of the disease Mr. Pellier terms the *Cataracte Secondaire*.

3. When the body of the lens and its capsule are both opaque, it commonly happens that the cataract is soft, or even altogether fluid. In this case, much attention is necessary in the operation of extraction, to prevent the capsule from bursting: a degree of nicety, Mr. Pellier observes, which those not much accustomed to this branch of practice can seldom arrive at, but which is very practicable with those who have had much experience in it.

4. In some instances cataracts appear to proceed from a partial affection of the lens, small opaque spots being observed in it, while the rest of it remains sound. In this case, vision is always most perfect in an obscure light when the pupil is most dilated.

In judging of cataracts from their consistence, there are three circumstances which more particularly require attention.

1. When a cataract is of a firm consistence, it is in almost every instance of a brown colour ; it appears in general directly behind the iris, and not so deep as the lens is usually placed, and the pupil dilates and contracts very slowly.

2. When it is fluid, it is not commonly white, but rather of a cream colour, somewhat resembling purulent matter ; and for the most part in this variety of the disease the globe of the eye appears full, and somewhat larger than usual.

3. It sometimes happens, Mr. Pellier observes, that along with this fluid state of a cataract, the capsule is considerably thickened. To this he gives the appellation of the *Cystic Cataract*.

The colour of a cataract is another point of importance.

1. We have just observed, that a thin fluid cataract is for the most part of a cream colour ; but in that variety of the disease which is observed in children at birth, although it is always fluid, the colour is almost always a milk white. In general, however, at other periods of life, a white cataract is of a cheesy consistence.

2. When a cataract is of a yellow colour, a small portion of the lens commonly remains hard, the rest of it being dissolved into a thin transparent fluid, forming that variety of the disease usually termed the *Hydatid Cataract*.

3. Although a black cataract is not a common occurrence, Mr. Pellier says he has met with different instances of it. The only disease for which it may be mistaken is the *gutta serena* ; but it may be distinguished from it by attention and observation. In the *gutta serena* the disease for the most part comes on suddenly, the pupil is of a deep black, it remains immoveable in every degree of light, and the patient cannot distinguish colours, or the clearest light from perfect darkness ; whereas, in the black cataract, the accession of blindness is commonly slow and gradual ;  
the



PLATE XXXIX

FIG 1



FIG 2



FIG 3



FIG 4.

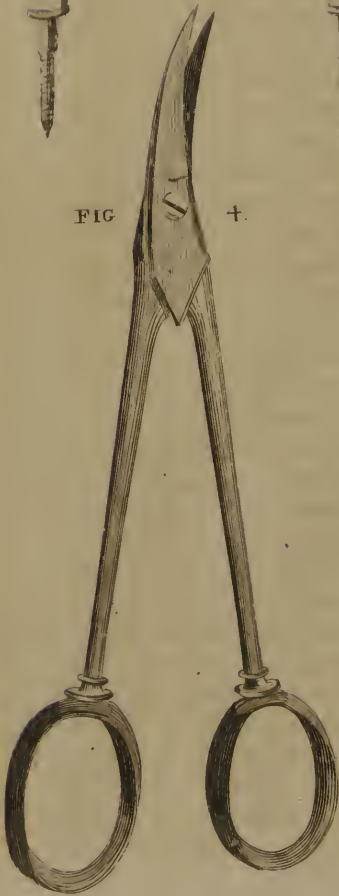
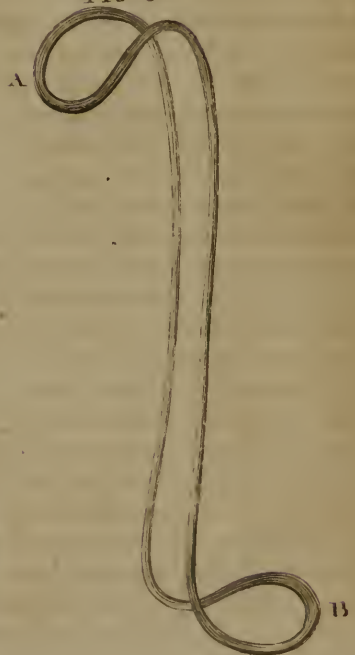


FIG 5.



the pupil contracts and dilates according to the degree of light to which it is exposed ; the bottom of the eye is of a dark colour, but not of such a deep black as in the gutta serena ; and the patient can distinguish light and vivid colours. In short, the symptoms of this variety of the disease are exactly the same with those of the common cataract ; only, instead of being white, the opacity is black.

With respect to the maturity or ripeness of a cataract, Mr. Pellier pays no regard either to the colour or consistence of the lens. He always considers the operation as proper, when the opacity has proceeded so far as to deprive the patient of sight, when it is not complicated with some other incurable disease, and when the habit of body is good. He prefers the method of cure by extraction, excepting in a few cases where the pupil is extremely small, when he operates by depression. He always prepares his patients for the operation, by confining them to a low diet for five or six days ; by giving two or three doses of salts and fenna ; and when they are plethoric, he takes away ten or twelve ounces of blood.

In extracting the cataract, he makes the incision of the cornea in the ordinary place and of the usual size ; but he has some peculiarities in his method of doing it.

Instead of placing his patient with his face opposite to a clear light, he seats him with his side towards it. If he is to operate upon the left eye, he uses his right hand, and the right side of the patient is placed towards the window. He always uses his left hand in operating upon the right eye ; and in this case the patient is made to sit with his left side towards the light.

The patient being seated with the eye which is not to be operated upon tied down with a bandage, an assistant supports his head behind, while at the same time he fixes the eye with the speculum, fig. 5. Plate XXXIX. The figure represents the instrument of the full size. It is made of wire ; and it may either be of gold, silver, or any other metal. The head be-

ing fixed by pressing it against the breast with one hand under the chin, the assistant takes this instrument in the other ; and placing the round curvature A, upon the upper eye lid immediately behind the tarsus or cartilage, he must by gentle gradual pressure fix the eye above, while the operator with the fore and middle fingers of his left hand, when the operation is to be done upon the left eye, must fix it below, at the same time that he draws down the under eye lid. In using this speculum the upper eye lid is forced almost entirely into the orbit, but it immediately returns to its natural situation on the instrument being withdrawn.

The eye being thus fixed, the knife, fig. 1. Plate XXXIX. fixed in its handle, must be put into the operator's right hand, who now divides the cornea in the usual manner : but when the point of it comes opposite to the pupil, if the capsule of the lens is to be divided, Mr. Pellier has arrived at such dexterity in this operation, that he plunges the point of the knife through the pupil into the lens ; and withdrawing it gently, he carries the point of it forward to the opposite side of the eye, and finishes the operation in the usual way. But in making the latter part of the incision, he is very attentive to the pressure made by the speculum, which he desires the assistant to remove entirely before the incision is completed, in order to prevent the vitreous humor from escaping.

This being done, the eyelids are immediately shut ; and while they are in this state, a slow, gradual pressure is made upon the eye ball, with the flat end of the instrument, which he terms a Curette, fig. 1. Plate XLII. which is placed immediately above the tarsus of the upper eye lid. As the access of light to the eye is thus prevented, the pupil remains in a state of dilation, by which the lens is more easily pressed out than it otherwise could be ; and if the pressure be applied in a cautious manner, no part of the vitreous humor is ever forced out.

When

When the cataract does not come out entire, which is sometimes the case, or when it is found to adhere to the contiguous parts, the end of the curette is introduced through the pupil, and with it any adhesions that occur are gradually separated; at the same time that any detached pieces of the lens are turned out through the opening in the cornea: Or, instead of the curette, the cistotome, fig. 3. Plate XL. is sometimes employed for separating such adhesions.

In the course of this operation, it sometimes happens that the iris is forced too much forward into the anterior chamber of the eye, or even altogether through the incision in the cornea. With a view to prevent the bad effects which might result from this, Mr. Pellier insinuates the flat side of the curette into the wound in the cornea, so as to press the iris into its natural situation.

This is the usual method in which Mr. Pellier performs this operation; but circumstances sometimes occur which require some peculiarity of management. The most material of which are these: When he has reason to conclude that the cataract is in a fluid state without any opacity of the capsule, instead of making any opening into the cornea of the usual size, he introduces a sharp pointed knife, somewhat convex on the back, into the inferior part of the transparent cornea at a proper distance from the iris; and having made an incision of about the tenth part of an inch in length, he pushes the point of the instrument upwards till it comes opposite to the pupil, when he carries it cautiously on till it reaches the lens; and having now made an opening in the capsule sufficiently large for discharging the fluid contained in it, he withdraws the instrument with the same caution with which it was introduced, and in this manner the operation is finished; as the cataract being in a state of fluidity, it passes easily off without any pressure.

When, again, along with a soft or fluid cataract, there is reason to suppose that any part of the capsule  
is

is opaque, or even where the capsule alone is supposed to be diseased, he carefully avoids opening it or bursting it in the course of the operation : in either of these events, he says, it would be with difficulty extracted. He therefore by slow gradual pressure with the curette, in the manner we have mentioned, forces out the lens, contained, as he imagines, in its capsule or cyst ; and he does it, he says, in every instance without forcing out any part of the vitreous humor. In some cases, however, he finds it necessary to introduce the end of the curette through the pupil, and to separate the capsule of the lens from the contiguous parts ; but even this, he says, does no harm to any part of the eye. The importance of our being able to judge from the appearances of a cataract of the real state of the disease is therefore sufficiently obvious, from the difference which this variety of it requires in the method of operating.

In extracting the cataract, it is a matter of the highest moment to avoid the iris with the knife ; but as this is extremely difficult in eyes that are not very prominent, in such cases Mr. Pellier employs a knife with that side of it convex which passes next to the iris. One of these instruments is represented in Plate XXXIX. fig. 2. In every other respect it is the same with the knife which he uses in ordinary cases, represented in fig. 1. of the same plate.

In the course of this operation, it sometimes happens that the aqueous humour escapes in too great quantity before the point of the knife is carried across the eye so as to penetrate the opposite side of the cornea : When this takes place, which it often does when the hand of the operator is not perfectly steady, as the iris is apt to pass in before the point of the instrument, Mr. Pellier advises the knife to be withdrawn, and the other knife, fig. 3. with a blunt or probe point, to be introduced at the opening in the cornea ; and the point being slowly carried over to the opposite side of the eye, an incision is there to be made, either with  
the

the other sharp pointed knife or with a common lancet, sufficiently large for letting out the blunt point of the other ; when the operation is to be finished in the usual way, by pushing it forward, and making a kind of semi circular incision in the under part of the cornea.

As soon as the cataract is extracted, it is the common practice to present a watch or some other object to the patient, with a view to discover the success of the operation. In some instances Mr. Pellier has been forced to consent to this, but he does not approve of it. Instead of this, he immediately closes the eye lids, and covers each eye with a small bag of soft old linen or cotton, about half filled with soft fine wool. These bags are applied dry, and are fixed with pins to a circular bandage of old linen passed round the forehead, which again is kept firm in its situation by a slip of the same linen made to pass beneath the chin and over the upper part of the head ; care being taken to fix them both with pins to the night cap below.

The patient is now to be undressed, and with as little exertion as possible should be laid in bed, upon his back, with his head very little elevated : and in this situation he should remain with as little variation as possible during the first six or eight days, as it tends more than any other he can be placed in to a speedy cure of the wound in the cornea. In the course of a few hours after the operation, Mr. Pellier always advises blood letting to the extent of eight or ten ounces, excepting in low emaciated constitutions. The patient is kept upon a low diet. He gives an opiate ; but prefers small doses frequently repeated to the giving a large dose at once, which often produces sickness and vomiting, which should by all means be guarded against ; for nothing so readily hurts the eye as the exertion of vomiting, coughing, and sneezing. For which reason he does not admit of tobacco being used in any form, for the first eight or ten days.

The belly should be kept moderately open by gentle

the purgatives, and on the fourth or fifth day the dressings may be removed; and after clearing the eye of any matter that may have collected, and the eye lid being cautiously lifted to examine the state of the wound, the same kind bandage must be applied again. From this time forward the dressing should be renewed every second day, and in ten or twelve days from the operation, the eye should be bathed, before the new bandage is applied with a weak saturnine solution; but till this period warm milk and water is considered as preferable. About the end of the third week the bags of wool, after having been gradually lessened, may be taken away entirely, and a piece of green silk put over the eyes instead of them. If no interruption occurs to the cure, the diet may be made gradually better; and when one eye only has been operated upon, Mr. Pellier commonly allows the patient to go abroad at the end of the fourth week, but never sooner; and even then the eyes are directed to be well covered: But when both eyes have been cut, he advises a confinement of at least six weeks.

This is the plan of treatment which Mr. Pellier pursues in ordinary cases; and he attributes much of the success with which his operations are attended to a rigid observation of these regulations. But where there is a particular tendency in the system to inflammation, remedies of a different kind are required.

The eye becomes in some cases so much inflamed even in the course of a few hours from the operation, that one blood letting does not prove sufficient. In this case he advises leeches to be applied to the neighbourhood of the eye; and if a second or third general evacuation is necessary, he directs the blood to be taken from the foot, as by experience he finds this to prove more successful than taking it from the arm or neck. The patient is desired to drink plentifully of Arabic emulsion, with a large proportion of nitre. The pediluvium frequently repeated is supposed to prove very serviceable. And, for the removal of that violent  
pain

pain which inflammation supervening to this operation commonly excites, nothing that has yet been tried, he thinks, answers so well as a liniment composed of the white of an egg and powdered alum beat for a considerable time together : a little of which should be applied to the eye every two hours between two plies of a bit of soft old linen. Besides affording relief from pain, it tends more effectually than any other remedy to stop the progress of inflammation ; inso-much, that Mr. Pellier employs it in every case as soon as the eye begins to inflame.

Instead of alum, he sometimes adds to the white of an egg three grains of white vitriol, and as much of saccharum saturni dissolved in a spoonful of rose water ; and the whole being well beat together till it puts on the appearance of white froth, a little of this is inserted between the eye lids with a small pencil three or four times a day, at the same time that the eye lids are covered with a small bag of thin linen in which some of it is contained. When the heat and pain attending the inflammation begin to abate, he advises a poultice composed of a ripe apple well boiled, with the water pressed out of it, and a small quantity of camphor and powdered saffron added to it.

By persevering duly in these means the inflammation is commonly at last removed. It is otherwise, however, in some instances : inso-much, that notwithstanding the utmost attention, every symptom is aggravated ; the vessels of the tunica conjunctiva become extremely turgid ; the eye lids swell to a considerable size ; and the pain, which before was severe, is now insupportable. In this situation, nothing has ever any effect in stopping the progress of the inflammation but local blood letting carried to a considerable extent by incisions made in the affected parts. For this purpose the mere division of the turgid vessels with a lancet or small scalpel sometimes answers ; but in general it proves more successful to take away small portions from different parts of the internal surface of the eye lids

lids with small convex scissars, such as is represented in Plate XXXIX. fig. 4. This, Mr. Pellier observes, seldom fails of giving immediate relief; and he has never afterwards found it produce any inconvenience. The state of the eye too being very critical, no remedy should be omitted that affords any chance of obviating the present danger; for if this be not quickly done, suppuration will soon take place either in the coats of the eye, or in one or both of the chambers.

When matter is evidently formed, a frequent use of warm emollient fomentations, applied particularly to the eye by means of a funnel of pasteboard, will sometimes produce a slow discharge of it at the incision in the cornea: but when this does not succeed in the space of eight and forty hours, no more time should be lost; the matter should be evacuated by an incision made in the most depending part of the abscess, when it is seated in the substance of the cornea; or, by opening the lips of the incisions made for extracting the cataract, when the collection is in either of the chambers of the eye. By this means the patient will be immediately relieved from pain, while at the same time he will receive the only chance of preserving the use of his eye.

There is still another disagreeable occurrence to which patients are liable during the first two or three weeks after this operation; a kind of staphyloma, or herniary swelling, formed by the iris, or some other part, being forced out at the opening in the cornea, either by violent coughing, sneezing, or some other effort; and in some instances, by exposing the eye too soon and too frequently before the cicatrix is sufficiently firm for resisting the pressure thus produced upon it. When the swelling which thus takes place is small, it may commonly be removed by touching it frequently with a small pencil dipped in Goulard's extract of lead, concentrated by evaporation, or in any mild antimonial escharotic: An attempt, Mr. Pellier observes, that may be made with perfect safety, if care  
be

be taken to prevent the caustic from hurting the rest of the eye, by touching the diseased part only with it, and immersing the whole eye immediately in warm milk, or in some warm emollient decoction. But when the disease is farther advanced, and if it be of a firm solid nature, it answers better to remove the protruded part entirely either with the knife or the scissors ; or if it appears to be any part of the aqueous humour contained in a thin membranous production, as is sometimes the case, all that is in general necessary is, to make an incision into it with a lancet of a size sufficient for discharging it. It is scarcely necessary to observe, that after either of these operations, the parts must be treated with much attention, otherwise, instead of proving serviceable, they may do harm. A strict antiplogistic regimen must be observed. The eye should be lightly covered, either with a small bag, such as we have mentioned above, filled with soft wool, or with a compress of old linen soaked in a weak solution of saccharum Saturni.

Mr. Pellier's method of extracting the cataract, which I have thus endeavoured to describe, with his treatment of the consequences which sometimes ensue from it, is the result of much experience, and usually proves more effectual than any other with which we are acquainted. Much of Mr. Pellier's success undoubtedly proceeds from his superior dexterity in performing the operation ; but much of it also depends upon the minute attention he pays to every case for a considerable time after the operation. In ordinary practice, and especially with the most part of itinerants, it is commonly supposed, if the operation be properly performed, and if the cataract comes away easily, that very little more is necessary on the part of the operator ; but it is much otherwise with Mr. Pellier, who considers the after treatment as so essential, that it is with difficulty he is ever prevailed upon to operate where he cannot have the subsequent management of the case for two or three weeks : And by constant and  
affiduous

assiduous attention, he is often able to obviate symptoms which might otherwise prove alarming; and which, in many instances, might even render operations abortive which would otherwise be attended with the most complete success. Of this I have seen different instances.

In a former part of this work, I entered into a full discussion of the respective merits of the two operations of couching and extracting the cataract; and I then endeavoured to establish the preference of the former: But if experience shows, that Mr. Pellier's method of operating is attended with more permanent advantages, I shall be very ready to retract my opinion; for which purpose, I shall carefully attend to the consequences of those operations which he has performed in this country; and as the public will probably be interested in them, I shall at some future period perhaps communicate the event of them.

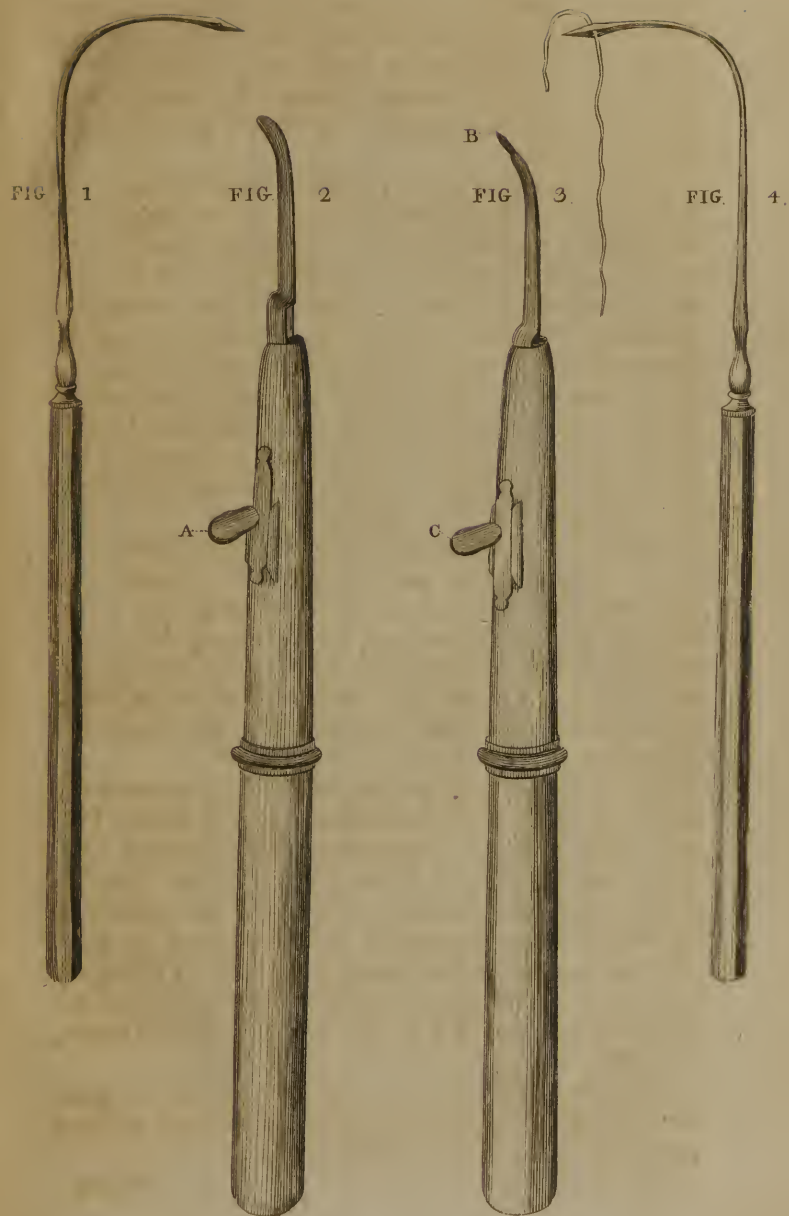
There are two points of importance in this operation, with respect to which I differ in opinion from Mr. Pellier. When he considers it as proper to divide the capsule of the lens, he frequently does it, as we have already observed, by insinuating through the pupil the point of the same knife with which he makes the incision of the cornea, even before the incision is completed.

This may possibly be done with safety in every instance by such a very dexterous operator as Mr. Pellier: but as most practitioners, by imitating him, would run the risk of hurting the iris, the practice should not be encouraged; for when the capsule of the lens is to be divided, it is surely better to do it after the incision of the cornea is finished, by lifting up the flap, and passing in the end of the blunt probe represented in Plate XXX. fig. 5. or of the cistatome, Plate XL. fig. 3.

The other point to which I allude respects the practicability of extracting the capsule of the lens, without doing any material injury to the eye.

When

PLATE XL





When the cataract appears to be of a firm consistence, and when the disease is supposed to be confined entirely to the lens itself, Mr. Pellier frequently opens the capsule in the manner I have just described, with a view to allow of a more easy extraction of the lens ; and in this case he admits that the capsule remains in the eye : But when he finds, after an operation, that the capsule of the lens becomes opaque, or if he observes that any part of it has been previously in a state of opacity, he advises it to be cautiously extracted with small forceps : And again, in every case where he suspects the cataract to be fluid, forming what he calls the Cystic or Hydatid Cataract, he avoids the division of the capsule, and advises the lens to be taken out included in it ; which he says may be done in the manner we have mentioned, by making an equal and gradual pressure upon the ball of the eye immediately after the division of the cornea ; or by separating any adhesions which take place between the capsule of the lens and the contiguous parts, with the curette passed through the pupil.

I have not indeed seen Mr. Pellier extract the capsule of the lens after removing the lens itself ; for no cases requiring it occurred during his residence here : I received however full information of his method of doing it, by introducing small forceps at the pupil. But as I cannot imagine how this can be done without injuring the eye materially, I must still retain the opinion I formerly advanced of it, till I have evident proofs of its being practised with advantage : And whenever these are offered, I shall receive them with much satisfaction, as it would in many instances be a material improvement of this operation.

We have now to consider the possibility of extracting the capsule entire along with the lens : Several practitioners in this country had opportunities of seeing Mr. Pellier extract cataracts, as they supposed, in this situation. I saw him operate in two instances of

this kind, where he, as well as several others, imagined that the real capsule was taken out along with the lens; but as I entertain a different opinion on this subject, it is proper to state the reasons which have led me to adopt it.

1. The capsule of the vitreous humour, and that which contains the lens, are so intimately connected together, that it is difficult, or perhaps impossible, for the best anatomist to determine whether they are separate productions or not: At least they are so intimately connected, that they appear to be formed of the same substance, the crystalline lens being surrounded with a coat which seems to be a thin lamella of that which forms the capsule of the vitreous humour. The contrary, I know, has been alledged; but whoever will make the experiment, will find that the capsule of the lens has exactly the appearance which I have mentioned. It appears to be a production of the other; and they cannot be separated without tearing or destroying some part of one or both of them: Now, if this is the case, when the contents of the eye are all laid open, and when all the assistance can be got that nice dissection affords, it appears to me impossible that they should be separated in the operation of extracting the cataract without injuring the rest of the eye, and particularly the vitreous humour, very materially.

2. In performing this part of the operation, viz. in attempting to extract the capsule of the lens entire, Mr. Pellier does it by means which do not appear adequate to the intended effect. He does it, in most instances, by making a gradual equal pressure over the ball of the eye, and not by the introduction of forceps. Now it is difficult to conceive in what manner pressure applied to the eye can separate that intimate connection which certainly takes place between the capsule of the vitreous humour and that of the crystalline lens: By pressure they are frequently both forced out; but no operator would wish to meet with this, and no  
person

person guards more effectually against it than Mr. Pellier, inasmuch, that the escape of the vitreous humour, or even of any part of it, is an occurrence he rarely meets with. In some cases indeed Mr. Pellier insinuates his curette, as we have already remarked, through the pupil, with a view to detach the capsule of the lens from the contiguous parts : He allows however that this is not always necessary ; and besides, there is much cause to suspect that the eye would often be hurt by it.

3. When it is found, as we have already observed, either during the operation of extracting the cataract, or afterwards, that the capsule of the lens is opaque, even Mr. Pellier himself does not attempt to extract it by pressure. In this case he does it with forceps passed through the pupil. Now, if pressure answers in one variety of the disease, it ought probably to do so in others, so that the use of forceps should not be necessary ; but it is only in the hydatid or soft cataract which Mr. Pellier allows that this practice by pressure succeeds.

4. But as several practitioners, both here and elsewhere, have seen Mr. Pellier extract the cataract, surrounded, as they imagined, with its proper capsule ; and as he asserts with confidence, that it may be done merely by pressure ; it will be asked, In what manner is this apparent contradiction to be explained ? I can account for it only on the supposition of there being in all such cases, where this practice of extracting the capsule entire is considered as admissible, a preternatural formation of a new membrane within the capsule of the lens ; which being of a firmer nature than the capsule itself, and probably very little, if at all, attached to the contiguous parts, we can easily see how it may be forced out entire, even by moderate pressure, and how easily bystanders may be deceived with it. When I first saw it done by Mr. Pellier, as I had previously been informed that the whole capsule would be extracted along with the lens ; as I had

heard from very respectable authority that he had done it in different instances at Glasgow; and as I certainly saw the crystalline pushed out, surrounded with a membranous bag, I must own that I was nearly converted to Mr. Pellier's opinion: But on further consideration, the reasons I have mentioned against it appeared too conclusive, even for this weight of evidence to remove; and since that period, a circumstance has occurred, which with me puts the matter beyond a doubt. A cataract of a soft nature was extracted by Mr. Pellier, surrounded with this membrane or bag quite entire. From the first I doubted much of its being the proper capsule of the lens, as it was said to be: for this tunic is well known to be exceedingly fine and delicate; whereas this was a membrane of a tolerable degree of firmness, which required some force to tear it. The patient however distinguished objects immediately after the operation; and what was then advanced concerning it, could not be well refuted: But by some cause or other, possibly from the eye becoming inflamed, an opacity soon began to form in the old site of the crystalline, directly behind the pupil, forming, to all appearance, a real cataract; and it now continues even after the inflammation is removed. Whatever explanation may be given of this by those who are inclined to support the contrary opinion, it proves to me a convincing proof, that some deception takes place in those cases where it is supposed the capsule is extracted entire along with the lens; for in this case, where the capsule was imagined to be taken entirely out, the opacity which succeeded, and which still exists, appears evidently to be seated in the capsule, and no where else. I therefore conclude, where practitioners have imagined the capsule has been extracted entire, that they have been deceived by the lens being enveloped with a preternatural bag or cyst, formed, perhaps, by an inflammatory exudation from the internal surface of the capsule: That this production however, is always formed in this manner, I will not positively assert;

fert ; but in my opinion it is the most probable way by which we can account for it.

In this variety of cataract, however, it is certainly right to attempt the extraction of this membrane, for vision will not be perfect while it continues in the eye. But if I may venture to dissent from the opinion of one so versant in matters of this kind as Mr. Pellier is, I would observe, that we should not, even in the most fluid cataract, endeavour to extract it without opening the capsule so as to discharge the contents of it ; for as the cyst of which we have been speaking does not appear to be firmly attached to the neighbouring parts, it is probable it would be separated from them with as much ease when quite empty as when perfectly full, and it would in this state pass through the pupil with much less risk of hurting the iris ; an object which we have elsewhere endeavoured to show, is perhaps the most important of any in this operation.

These are the remarks I have to offer on Mr. Pellier's theory and practice in the cataract. If farther observation shall convince me that I am wrong, I will readily acknowledge my mistake ; but in the mean time, the reasons I have adduced appear to evince the impropriety of extracting the capsule piecemeal by means of forceps passed through the pupil, as well as the impossibility of making it pass entire along with the lens.

Mr. Pellier's practice, as we have already observed, is not confined to the treatment of the cataract. He is equally accustomed to the management of every other disease to which the eyes are liable. In all of them he has acquired much useful experience ; but we shall confine our account of his practice to those points in which his improvements appear to be of most importance.

In the treatment of ophthalmia or inflammation of the eyes, whatever may be the cause of the disease, he condemns the use of emollients, and trusts entirely to remedies of an opposite nature. When the inflammation is violent, is of long duration, and does not yield

to the usual means employed for it, he recommends a free division of the turgid vessels on the adnata; and in order to do the operation effectually, he carries an incision round the whole globe of the eye, on that part of it where it appears to be most inflamed. The curved sharp pointed knife, Plate XLI. fig. 5. he recommends as the best instrument for this operation. But with those not much accustomed to it, I believe it will be easier done with the knife delineated in Plate XXXI. fig. 3.\*

The scarifications being completed, the eye should be immediately bathed in warm milk and water, in order to promote as much as possible a free discharge of blood: and this being done, he advises a little of the following ointment to be introduced on the end of a blunt probe between the eyelids, to be repeated once or twice daily as long as the disease may continue, at the same time that a weak saturnine solution is employed morning and evening as a wash.

R. Mercur. precip. rubr.

Lapid. calamin. pp<sup>tt</sup>. ʒiſs.

Lythargyrii pp<sup>tt</sup>. - ʒi.

Tutiæ pp<sup>tt</sup>. - ʒſs.

Cinnab. nativ. - ʒi.

F. pulv. tenuiſſim. et miſce cum axungia porcinae ʒii. et adde baſſam. Peruviani gutt. xv.

This ointment Mr. Pellier makes uſe of with much freedom and advantage in all diſeaſes of the eyes that have either been induced by inflammation, or that happen to be attended with it; and he finds it particularly uſeful in thoſe caſes of Albugo or Leucoma where corroſive applications are admiſſible.

It ſometimes happens in the ſmall pox, as well as in ſevere inflammatory affections of the eye, from whatever cauſe they may originate, that the centre of the cornea is left in a ſtate of opacity, by matter forming  
between

\* I was clearly of this opinion when the firſt edition of this volume went to the preſs; but having of late made trial of Mr. Pellier's inſtrument in ſeveral caſes, I muſt do him the juſtice of acknowledging that it anſwers better than any other I have ever uſed.





between the coats of it, When this is not carried off by the remedies usually employed, if the iris, retina, and other parts of the eye appear to be sound, Mr. Pellier advises an operation, from which he has in different instances derived much advantage. The centre of the cornea being opaque, the rays of light are thus prevented from passing to the bottom of the eye through the pupil; but when the sides or external border of the transparent cornea still remain clear and sound, light may be allowed to pass to the retina by enlarging the pupil; which, Mr. Pellier says, may be done with safety by making an incision from one side of the iris to the other. And his method of doing it is this: He first makes an incision in the prominent part of the cornea, in the same manner as for extracting the cataract: He then inserts a small grooved director beneath the flap of the cornea through the pupil; and having passed it in a horizontal direction immediately behind the iris towards the outer angle of the eye, he now takes a pair of small curved scissors, and passing one of their blades along the groove of the director, he at once divides this part of the iris, when he withdraws the instruments and makes a similar incision on the opposite side of the eye. By this means, when the opacity is confined to the centre of the cornea, which is frequently the case, the rays of light which pass through the sides of it will now get access to the bottom of the eye, by the pupil being extended from one side of the iris to the other: and thus a degree of vision will be produced which could not otherwise be obtained. It will readily be imagined that perfect vision is not to be expected in this state of the eye; for a variety of reasons concur against it: but it is a matter of much importance for a person already totally blind to be rendered capable of finding his way, and of conducting himself from one place to another, which by this operation Mr. Pellier has done in different instances: and, so far as I know the public are indebted to him alone for proposing it.

After the operation, the eye must be tied up, and treated in the same manner and with the same attention as is done after the extraction of the cataract ; for where so much violence is done to the eye, if inflammation be not guarded against, much mischief may occur from it.

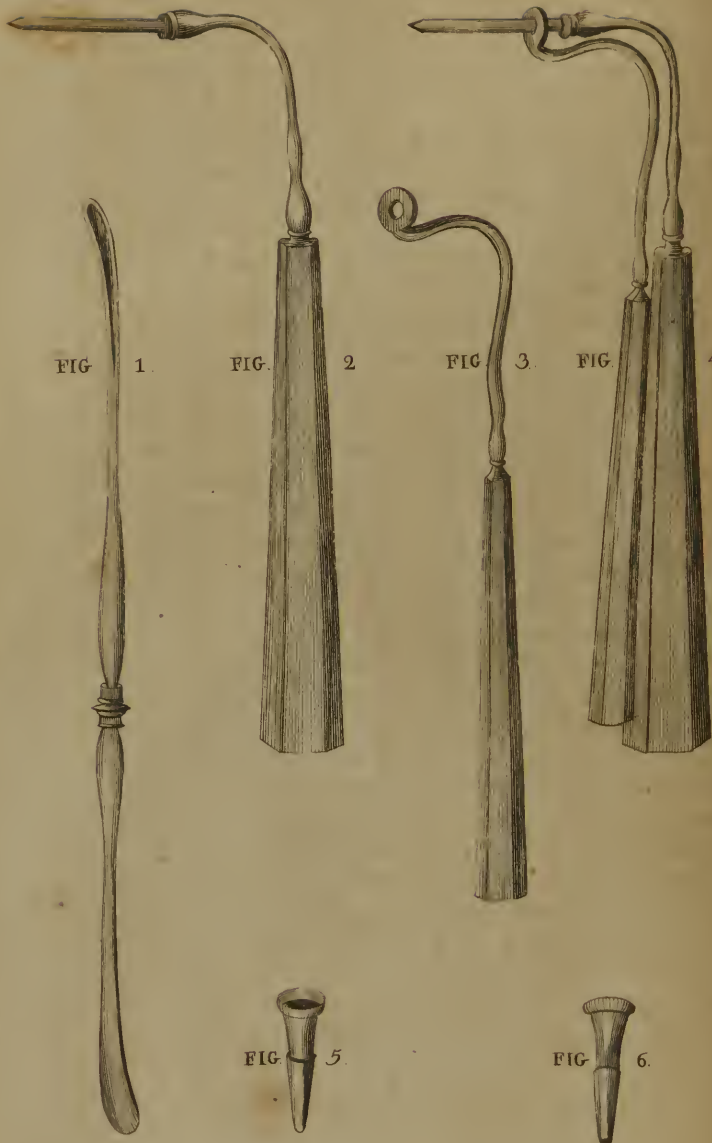
In describing the method of dividing the iris, we have said that it should be done with the scissors ; for this membrane being loose and unsupported, it would yield before the edge of the sharpest knife. In the introduction of the director and scissors, care should be taken, in passing them between the iris and lens, not to injure either the lens or its capsule ; that is when the disease is not complicated with a cataract ; for when the crystalline is opaque it should be extracted.

In the treatment of the fistula lachrymalis, Mr. Pellier has much merit ; for, with most operators, it seldom happens that any permanent advantage is obtained from any of the remedies employed in it, and even they who are much accustomed to the management of it often fail entirely. Mr. Pellier does not say that he always succeeds ; but he does so in most instances ; and I know that his method has often proved successful where others have failed.

In a confirmed fistula lachrymalis, the curative intention is, to form an opening between the lachrymal sac and the corresponding nostril. There are different methods of effecting this : By searching with a blunt probe, to discover the natural passage : If this fails, by making an artificial opening through the os unguis : and when neither of these succeed, by leaving a tube or canula, either in the natural or artificial opening, for the purpose of conducting the tears to the nose.

As we know from experience, that the operation fails in various instances, from the passage becoming again impervious, and this whether it may have been done by opening the natural passage or by forming another, it would be the idea perhaps of most practitioners





tioners to leave a tube in the opening, were it not liable to one very material objection, namely, the uncertainty of its continuing fixed in its situation : for hitherto we have not been possessed of any certain method of preventing the canula either from rising and forcing its way out at the corner of the eye, or from passing down and coming out at the nose. In Plate XXXVII. I have already delineated various forms of tubes which have been used for this purpose ; and of these, figures 3. and 10. will in most cases, I believe, be found to answer : for when they are pressed sufficiently into the opening through the os unguis, the bulge or prominence with which they are furnished above, will for the most part prevent them from rising, while their conical shape will prevent them from passing into the nose. I must, however, acknowledge, that they sometimes fail ; and that an invention of Mr. Pellier's appears to be much superior to them. I know one instance in which it has hitherto answered completely, and many months have elapsed since the operation.\* From the form of the tube, there is much reason to imagine it will answer ; and Mr. Pellier asserts, that when it is properly introduced it never fails. Two representations of it are given in Plate XLII. figures 5. and 6. It may be made either of gold or lead. Mr. Pellier commonly employs lead : but when made of gold, the tube will not be so bulky if of the same strength ; and as this metal receives a finer polish, by which the opening through it will not so readily fill up with the tears, it ought, I think, to be preferred.

The peculiarity of form of Mr. Pellier's tubes consists in their having two projecting edges ; one at the top, forming a kind of brim, corresponding as nearly as possible to the size of the lachrymal sac ; and the other near to the middle between this and the other end of the instrument ; by which means, when it is properly

\* It is now eighteen months since this operation was performed : The tube still continues fixed in its situation ; it is not productive of any kind of uneasiness ; and the cure is complete.

properly fixed in the passage where it is to remain, it is kept firm in its situation by the granulations which shoot out from the contiguous parts ; and which, by grasping as it were that part of the tube which lies between the two edges, effectually prevent it from passing either upwards or downwards ; and hence that material inconvenience is avoided which practitioners who employ cylindrical tubes always complain of.

It is necessary, however, to observe, that the utmost nicety is required in the use either of these, or indeed of any other tubes ; in the first place, in adapting them with exactness to the size of the openings through which they are to pass ; and afterwards in the introducing them a proper length into the nose : For if a tube be either too small or too large for the opening through the os unguis, we may readily imagine that it will not answer ; and if it be pressed even a very little too far into the nostril, it will necessarily irritate the lining membrane of that cavity, so as to create much pain and inconvenience. The tubes represented in Plate XLII. are of a size both in length and thickness which answer for the most part of adults, but practitioners should be provided with them of various sizes.

The method of using them is this. After laying the lachrymal sac freely open in the usual way, the natural conduit of the tears is searched for, either with a firm probe, or with the conductor, Plate XLII. fig. 2. and Mr. Pellier asserts that he never fails in finding it. As soon as this is discovered, the tube must be put upon the conductor, previously furnished with the compressor, fig. 3. as in fig. 4. and it should be of such a size that the conductor may fit it exactly in point of thickness, while the end of this instrument is so much longer as to pass through it about the tenth part of an inch. The point of the conductor is now to be insinuated into the lachrymal duct ; and being pushed in till it reaches the nostril, which may be known either by inserting a probe into it, or by a few drops of blood being observed to fall from the nose, the conductor  
being

being no longer necessary, must be withdrawn, taking care to leave the compressor upon the upper brim or edge of the canula; which must be firmly pressed down with it in the left hand, while the conductor is removed with the other. If this precaution be not attended to, the canula would be brought out along with the conductor; but this inconvenience is in this manner very effectually prevented, while the same instrument serves more easily than any other to press the canula to a sufficient depth in the lachrymal duct: a point of the first importance in the performing of this operation; for if the canula be not fixed with some degree of firmness even at the first attempt, there will afterwards be more pain and difficulty in doing it.

This being done, the compressor must next be taken out; and, with a view to discover whether the canula is at a proper depth or not, a little milk and water should be injected through it with the syringe, Plate XXXVII. fig. 1. If the injection passes freely and easily into the nostril, while the upper part of the canula is pressed down to the middle of the lachrymal sac, there will be no reason to doubt of its being properly placed: If, on the contrary, any obstruction occurs, there will be reason to suspect that it is already pushed too far, and that it presses against the os spongiosum inferius; in which case the canula should be withdrawn, with a view to shorten it, when it must be again introduced in the manner we have mentioned.

As the wound recently made in the sac will yield a considerable quantity of matter, it is necessary to preserve it open for eight or ten days with a bit of soft lint spread with any emollient ointment, taking care to cover the whole with a compress of soft old linen, secured with a proper bandage. An injection of milk and water should be daily passed through the canula; and at the end of this time, or whenever the suppuration is much diminished, and the sore looking clean and healthy, the dossil of lint must be entirely removed; and a piece of court plaster being laid over the sore, it

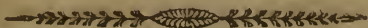
may in this state be left to heal, care being taken to renew the plaster if any matter appears to form beneath it.

By this mode of treatment, cases of fistula lachrymalis, that do not depend upon diseased contiguous bones, or any latent disease of the constitution, will for the most part, as Mr. Pellier observes, be completely cured in three weeks, nay sometimes in a fortnight, which by the usual practice might require three, four, or five months.

As I have been witness of the most complete success of Mr. Pellier's practice in this disease, I have considered it as a point of justice, not only to Mr. Pellier, but to the public, to give this full detail of it. Indeed, if I had not been convinced of the superior utility of Mr. Pellier's practice, and of the unreserved manner in which he communicated his knowledge of the diseases of the eyes, I should have deemed it impertinent to have given the preceding account of either to the public.

Since the first edition of this volume was published, the opinion which I then suggested, of the impossibility of extracting the capsule of the lens entire, has been the subject of much investigation: And as it now appears that it cannot be done, I still conclude, that Mr. Pellier, and others who adopted a different opinion, have been deceived.

## CHAPTER XXVIII.

*Of the DISEASES of the NOSE and FAUCES.*

## SECTION I.

*Anatomical Description of the NOSE and FAUCES.*

A MINUTE description of these parts is not necessary for our purpose; but a few remarks upon their general form and structure may serve in some measure to elucidate the nature of those diseases to which they are liable.

The external prominent part of the nose is chiefly composed of bones and cartilages, which serve to protect the more deep seated parts of the organ of smell, and to form a kind of vaulted passage for the air to the throat.

This passage, divided by the septum nasi, forms the nostrils, which extend almost in a horizontal direction from the superior part of the upper lip backwards to the pharynx, where they terminate above the velum pendulum palati.

The superior and lateral parts of the arch of the nose are formed by the nasal process of the os frontis—by the two ossa nasi—by the ossa unguis—and by an extensive process from each of the ossa maxillaria, to which the cartilaginous alæ of the nose, covered by the common teguments, are immediately attached.

The septum narium is formed by the nasal process of the ethmoid bone—by the vomer—by the middle cartilage of the nose—and by the spinous processes of the palate and maxillary bones.

The

The under part of the cavity of the nose is anteriorly bounded by a horizontal process of the ossa maxillaria, and backwards by a process of a similar form, from each of the ossa palati. The sphenoid and ethmoid bones form the boundaries of the posterior part of the nares.

Towards the upper part of the nose, we meet with a very beautiful contrivance of nature for enlarging the organ of smell. In the superior part of each nostril, opposite to the septum, we find a spongy, cellular production of bone, proceeding from the os ethmoides, which, from their form, texture, and situation, are termed *Conchæ*, *Ossa Spongiosa*, or *Ossa Turbinata Superiora*: And beneath these, on the same side of the nostrils, are two bodies of a similar texture, which have likewise been supposed to be productions of the ethmoid bone, but of which there is no evidence. These, from their situation, are termed *Ossa Spongiosa Inferiora*. In some instances, two, and even three, small bones of this kind have been met with in each nostril; but this is not a frequent occurrence.

These bodies being prominent, and even somewhat irregular on their surfaces, give the nostrils a winding, or even a crooked appearance: but every practitioner will know that they are so in appearance only; inasmuch that a common probe may be passed almost in a straight line from the external nares to the throat.

We meet with several openings which terminate in the nostrils, some of which it is material for surgeons to be acquainted with; viz. The *ductus incisarii*, which commence at the under and back part of the nostrils, and terminate behind the *dentes incisivi* of the upper jaw; the sinuses of the sphenoid and frontal bones, which both open into the upper part of the nares;—the sinus of each maxillary bone, commonly termed the *Antrum Maxillare*, or *Higlmorianum*, which opens into the nose between the upper and under ossa spongiosa of the same side; and lastly, the ducts of the lachrymal sacs, which we have formerly had occasion

to describe, and which terminate on each side immediately beneath the os spongiosum inferius.

All the cavity of the nostrils ; the different sinuses we have mentioned, as well as the passages leading to them ; the whole surfaces of the ossa spongiosa, and even the fauces, are covered or lined with a thick, soft membrane, which, from its affording a plentiful secretion of mucus, is commonly termed *Membrana Pituitaria*, or *Membrana Schneideri*, from Schneider, the first anatomist who gave an accurate description of it.

This membrane appears to be a continuation of the cuticle. Towards the external nares, near to its connection with the epidermis, it is exceedingly thin ; but as it proceeds backward upon the septum nasi and on the ossa spongiosa, it acquires a considerable degree of thickness ; and again becomes thin as it proceeds to line the different sinuses.

The cavity of the nose, as we have already remarked, is separated from the mouth by a plate of bone, formed by a process from each of the ossa maxillaria, and by the ossa palati. To the posterior edge of the last mentioned bone there is a firm membrane connected, termed the *Velum* or *Valvula Palati*, formed by a junction of the common membrane of the mouth, with a continuation of the *membrana Schneideri*, together with several muscular fasciculi, intended for the motion of this and the contiguous parts. This membrane, as it stretches back from the palate, falls down and terminates in the uvula immediately above the root of the tongue ; by which it is not only well fitted for preventing the food, during mastication and deglutition from passing up to the nose, but for conveying backwards to the pharynx all such parts of the mucus furnished by the membrane of the nose and contiguous sinuses as are not discharged by the external nares.

On each side of the throat, at the termination of the *velum pendulum palati*, there is situated a prominent glandular substance commonly termed the *Amygdalæ* or *Almonds of the Ear*. They are naturally of a soft, yielding

yielding texture; and in general they have excavations of different degrees of deepness on various parts of them, which, by those not acquainted with the usual appearance of these parts, are often mistaken for ulcerations. On looking farther into the throat, along the course of the tongue, a thin, elastic, cartilaginous body is observed, termed Epiglottis, which is so placed as to prevent the food from falling into the trachea in its passage from the mouth to the pharynx, a wide capacious bag, which terminates in the œsophagus, and occupies all that part of the throat which is seen on looking into the mouth.

From this description it is evident, that the pharynx is furnished with several openings or outlets. Below, it terminates in the œsophagus;—anteriorly, it communicates directly with the mouth;—and from the superior part of the bag it has a free direct communication with the posterior openings of the nostrils.

We shall now proceed to consider the diseases of the parts which we have described, and the operations which are practised in the treatment of them. The subjects to be treated of are, Hemorrhagies from the Nostrils—Ozæna—Imperforated Nostrils—Polypous Excrescences in the Nose and Throat—Extirpation of the Amygdalæ and Uvula—and Scarifying and Fomenting the Throat.

## SECTION II.

### *Of HEMORRHAGIES from the NOSTRILS.*

THE internal parts of the nose are supplied almost entirely with blood from the internal maxillary artery: And, in general, the branches of this artery which go to the nose are so extremely small, as to render a division or rupture of any of them an object of little importance. In some instances, however, the reverse of this takes place, and hemorrhagies occur  
from

from these parts which prove highly embarrassing to practitioners, and very hazardous to patients. They have sometimes even baffled every attempt that could be made to restrain them. However trifling, therefore, this evacuation may for the most part appear, it ought always to be treated with attention.

In a great proportion of cases, a proper application of cold puts a temporary stoppage to the discharge; and in general, any future returns of it may be prevented by blood letting, by a moderate use of cooling laxatives, and a low regimen.

In order to obtain all the advantages that may be derived from the application of cold, it must be employed in various ways, and to a considerable extent. The patient should be placed in a large apartment, with a current of cold air passing through it: His food and drink ought all to be cold: His face should be frequently bathed, and even immersed, in cold water, or in cold water with a proportion of vinegar: A strong solution of alum, or of any other astringent, should be used from time to time as a gargle: Compresses wet in any liquid of this kind should be applied over the nose: When in bed, he should be very lightly covered; and he should sleep with his head as high as possible.

By these means duly persisted in, nasal hemorrhages may in general be removed; but in some instances no advantage whatever is derived from them, and the flow of blood is not in any degree diminished by the most exact application of them.

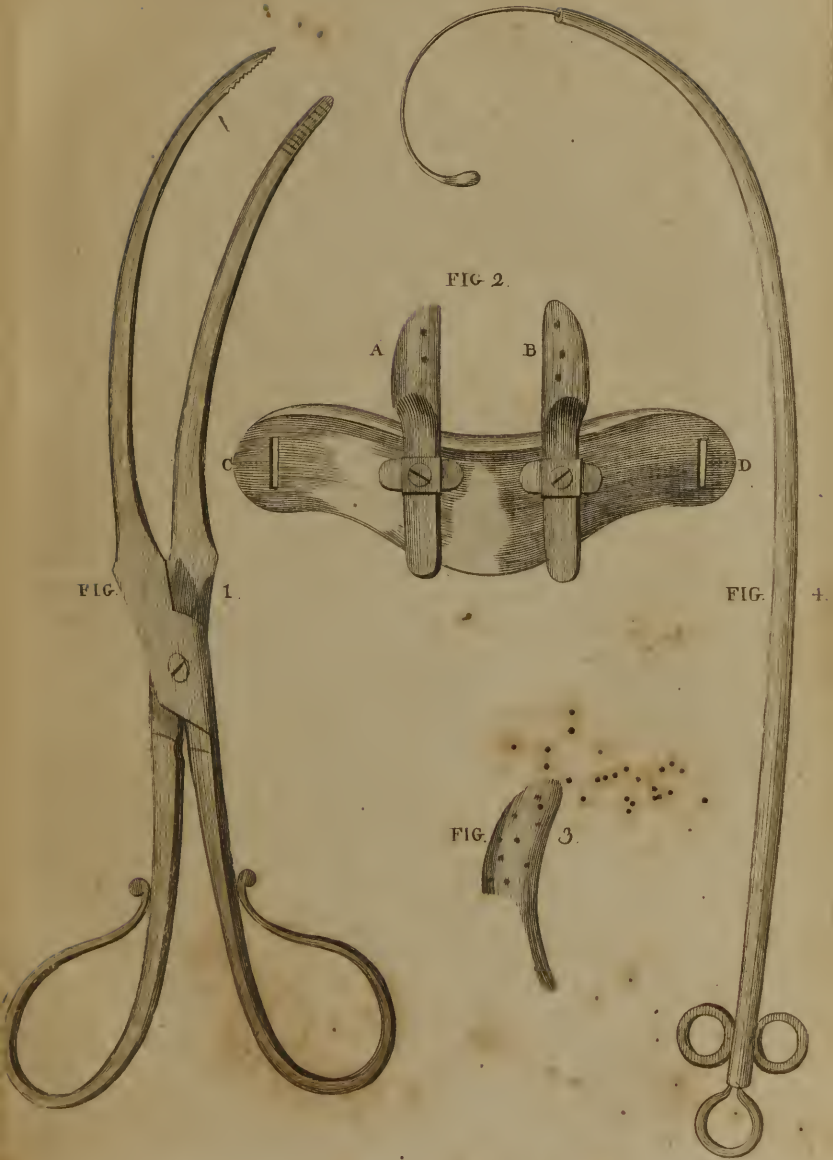
In such cases, compression of the ruptured blood vessel is alone to be depended on; but when the part affected is deeply seated in the nostril, the application of pressure is both difficult and uncertain. It will sometimes happen that a doffel of lint introduced into the bleeding nostril will put an immediate stop to the discharge. This, however, is a rare occurrence; for the extent and diameter of the passage through which the doffel must be pushed being very unequal, the ef-

fect produced by it must likewise be so : From this circumstance, we cannot place much dependence on this method of applying pressure.

In a former part of this work, when treating of evacuations of blood from the anus in cases of piles, we advised the application of pressure, by the introduction of a piece of gut, tied at one end, into the rectum, and by filling it at the opposite extremity with any cold liquid, to increase the degree of pressure by forcing up the liquid and securing it with a ligature. The same remedy may be employed in hemorrhagies from the nose. It has already been successfully made use of in a few instances ; and may frequently, we think, be employed with advantage. A piece of hog's gut, that has been previously dried and moistened again, answers best. One end of it firmly tied with a bit of small packthread, should, by means of a probe or director, be pushed along the whole course of the nostril from which the blood is discharged, to the upper end of the pharynx. The gut should now be filled with cold vinegar, water, or any other cold liquid, by means of a syringe inserted at the end hanging out at the nostril ; and as much being injected as the gut will admit, the whole should be pressed as far up as possible, and should be secured in this situation by a firm ligature.

In this manner a very considerable degree of pressure may be applied ; and some advantage may be derived from the application of cold directly to the vessel from whence the blood is discharged. In some instances, however, even this may be found to fail, owing to the ruptured vessel being so situated that pressure cannot in this manner be applied to it. In such circumstances, we must attempt by other means to put a stop to the hemorrhagy ; and it may commonly be done in the following manner.

Let the curved instrument, fig. 4. Plate XLIII. be inserted at one of the nostrils with a piece of catgut or firm waxed thread contained in it ; and being conveyed into the throat, the ligature must be laid hold  
of





of with a pair of forceps, and taken out at the mouth, when the instrument is to be withdrawn and again introduced at the other nostril with a ligature of the same kind. A bolster of soft lint, of a sufficient size for stuffing or filling up the posterior nares, is now to be firmly tied to the two ends of the ligatures hanging out at the mouth, when the opposite ends of them must be pulled forward at the nostrils till the cushion of lint is firmly applied to and fixed in the upper part of the pharynx ; when a compress of lint must be applied to each nostril, and fixed in this situation by tying the two ligatures over it. The patient should now be laid to rest. If the bolsters of lint have been properly applied, no blood will escape either from the posterior or anterior nares ; any blood that is effused into the nostrils will soon coagulate, and thus a stop will be put to the hemorrhagy. It is evident, however, that in order to insure success to this operation, the bolsters of lint should not only be applied with much exactness, but ought to be continued for a length of time sufficient for admitting of the healing or reunion of the ruptured blood vessels.

In fixing the bolster of lint in the back part of the mouth, we have advised two ligatures to be employed ; one to be passed through each nostril. In this manner it may be applied not only more firmly, but more equally, than by the usual method of only one ligature passed through that nostril from whence the blood is discharged.

### S E C T I O N    III.

#### *Of an OZÆNA.*

**T**HE term Ozæna has in general been applied to such ulcers of the nose as are foul, that discharge a fetid matter, and that are attended with a carious state of one or more of the bones ; whilst by some the

same general denomination of ozæna is applied to every ulcer in the nostrils, whether attended with a caries or not. At present we shall adhere to this last acceptance of the term.

Every catarrh affecting the lining membrane of the nose, is attended in a greater or lesser degree with an inflamed state of the parts immediately diseased. But we know, that in general this terminates easily, and that the inflammation is removed by a plentiful discharge either of mucus or of a thick yellow matter. In some instances, however, even after every other catarrhal symptom is removed, this discharge of matter continues obstinate, either from ulceration alone, or perhaps from ulceration conjoined with fulness and swelling of the lining membrane of the nose.

Exposure to cold is to be considered as the most frequent cause of this state of the disease; but external violence of every kind that terminates in an inflamed state of the membrane of the nose, such as the application of acrid irritating substances, blows and bruises, &c. may likewise be productive of it.

When the system is not affected with any other disease, this is the most simple variety of an ozæna; and as in this state we suppose the affection to be perfectly local, local remedies ought alone to be recommended,

In this state of the disease, applications of a moderately drying and astringent nature are chiefly to be depended on. Of these, decoctions of walnut tree leaves, of Peruvian or oak bark, mixed with a solution of alum, and all the saturnine solutions, are perhaps equal if not preferable to any. Brandy or any other ardent spirits diluted with water, and lime water, may likewise be employed with advantage.

Dossils of soft lint soaked in any of these should be introduced into the affected nostril three or four times daily, and should be pushed up as far as may be necessary for coming into contact with the affected parts; and every night at bed time an ointment should be applied,

applied, prepared with a considerable proportion of calcined zinc or of lapis calaminaris.

By a due continuation of these means, every local affection depending on ulceration of the membrane of the nose will be at last removed. But instances have occurred of other diseases being mistaken for sores in the nose, and of the running produced by them continuing to resist every effort that could be made for its removal. This is particularly the case with collections of matter in the antrum maxillare.

In the anatomical description we have given of these parts, we have seen, that there is naturally a passage or opening from the antrum maxillare into the nose immediately below and covered by the os spongiosum inferius of the same side. In collections of matter in this cavity, when in considerable quantity, it is occasionally discharged by this outlet into the nose in every posture of the body, and almost always when the patient lies on the sound or opposite side, if the passage be not obstructed. The method of treatment best suited for the removal of collections in the antrum maxillare will be the subject of a section in the ensuing chapter : At present we have only to say, that in the treatment of diseases attended with a discharge of matter from the nose, practitioners ought to be on their guard, lest, by mistaking one disease for another, mischief may be done ; not only by a misapplication of remedies, but by those means being omitted from whence alone any real advantage could be derived.

When, again, the matter discharged from an ulcer in the nose is thin, fetid, and of a brown or somewhat black colour, as there will be much cause to suspect from this that the contiguous bones are carious, it will be in vain to expect a cure till these are removed. We may in general be certain of the existence of caries merely by the peculiar fetor of the matter which such sores afford ; but when any doubt remains of this, we have it commonly in our power to be determined with certainty by the introduction of a probe.

As a carious state of the bones of the nose occurs more frequently as a symptom of lues venerea, than from any other cause, this ought to be kept in view in every affection of this nature : And whether we may be able to trace it with certainty as a symptom of this disease or not, whenever there is the least cause for suspicion, the patient ought, without hesitation, to be put upon a long continued course of mercury. Indeed, from whatever cause the disorder may arise, mercury will not probably do harm ; and as I have seen it prove serviceable even where there was no cause to suspect a venereal taint, I now in general make it a rule, in all such cases, to advise it immediately.

In the mean time the local treatment of the sores should be particularly attended to. The parts should be bathed from time to time with one or other of the decoctions already mentioned ; and as the soft spongy bones of the nose are apt, when carious, to produce troublesome fungous excrescences, ointments, impregnated with corrosive applications, should be employed occasionally ; and of these there are none I have ever tried that answer so well as prepared verdegris or red precipitate. There is a general prejudice indeed against the use of remedies of this kind in diseases of the internal parts of the nose, from a fear of their doing mischief, by irritating the very sensible membrane to which they are applied. There is no good cause, however, for this timidity ; and I can say from experience, that ointments, such as I have mentioned, of a strength sufficient for keeping down the most part of fungous excrescences, may be employed with much safety, and without any risk of injuring the contiguous parts. It is scarcely necessary to remark, that in the use of remedies of this kind, some prudence and attention is required to adapt the strength of them to the parts to which they are to be applied. The internal surface of the nose will not bear the same degree of irritation that may with safety be applied to some other parts of the body ; but it will bear the application of corrosive  
ointments

ointments more strongly impregnated than is commonly imagined. A liniment composed of wax and oil, with an eighth or ninth part of red precipitate, or a smaller proportion of verdegris, may in general be employed with perfect safety, and the corrosive powers of it can be occasionally increased or diminished. The growth of fungous excrescences being thus prevented, and the sores being kept clean by the frequent use of an astringent antiseptic wash, the passage of the nostril will be preserved pervious, the disorder will not spread so readily, and at the same time the diseased bones will probably be more quickly separated and thrown off than when these circumstances are not duly attended to.

Till the caries is removed, no permanent cure can be expected. The treatment therefore which we have just recommended should be persisted in till this is fully accomplished. Indeed, after a sufficient quantity of mercury is exhibited for the removal of any latent venereal taint that might exist in the system, all that we can expect farther from art, is to assist in the manner we have advised, in effecting a separation of such bones as are diseased. This being done, the sores will now be of a milder nature, and will in general heal by a continuance of the astringent applications we have already pointed out.

This is the practice which by experience I have found to prove the most successful in cases of ozæna. It must however be acknowledged, that no remedies with which we are acquainted can with certainty be depended on; and ulcers of this kind prove constantly extremely tedious, not only from the difficulty of reaching them with proper dressings, but from the ossa spongiosa, when they become carious, being always slow in exfoliating. When however the system is not otherwise diseased, the means we have mentioned, being persevered in, will very commonly accomplish our purpose.

## SECTION IV.

*Of IMPERFORATED NOSTRILS.*

**C**HILDREN are not unfrequently born with the vagina or anus in an imperforated state ; and although we know of no reason why the nostrils should not also be frequently imperforated, we are certain that it is a rare occurrence. Every practitioner, however, must have met with some instances of preternatural adhesions of the nostrils, the consequence of confluent small pox, of burns, or venereal sores.

Obstructions of this kind are in various degrees. In some cases the nostrils are only slightly contracted, without producing any material impediment of the breathing. In others, they are so much drawn together, as hardly to admit a common probe or a small quill : And in a few, the passage is entirely obliterated.

In all such cases it is the object of surgery to remove every preternatural obstruction ; but as any operation for this purpose is productive both of pain and inconvenience, the assistance of art is not frequently desired. It ought undoubtedly, however, to be employed whenever the breathing is much obstructed, or when the deformity produced by the disease is considerable.

When an opening is left in the obstructed nostril, however small it may be, much assistance may be derived from it in effecting our intention. A small grooved director being inserted into it, the passage may be easily enlarged to its natural size, by running a small bistoury or scalpel into the groove in the course of the adhesion : But when there is no passage whatever, whether the affection may be owing to a natural conformation, or to any other cause, we should, in the first place, by slow dissection with a small scalpel, endeavour

deavour to discover one of the nostrils, taking care, with as much caution as possible, to keep the opening in a proper direction between the septum and the contiguous external cartilage : And the passage being once discovered, it must be enlarged to the natural size in the manner we have mentioned, by the introduction of a director and bistoury. This being accomplished in one nostril, we must endeavour, by the same kind of cautious dissection, to discover the other.

A clear opening being thus formed into each nostril, our next object is to endeavour to preserve them of a full size, and to prevent adhesions from forming in any part of them ; which by experience we know are extremely apt to occur, and which can be prevented only by much attention.

The introduction of dossils of lint of an adequate size, or of any other soft substance, and retaining them till there is no risk of future adhesions, taking care however to withdraw them daily for the purpose of cleansing or renewing them, might no doubt answer our intention : but metallic tubes, adapted to the size of the openings, at the same time that they allow the patient to breathe with freedom through the nostrils, serve to distend the parts with more equality, and are more easily retained in their situation. Before being introduced, they should be covered with soft leather spread with any emollient ointment ; by which they fit with more ease, and will be more readily withdrawn at the different dressings.

Various forms of tubes have been recommended for this purpose. Those represented in fig. 2. Plate XLIII. are of a form which will be found to answer perhaps equally well with any that have been proposed ; and they may be retained either with a bandage round the head, or with adhesive plasters connected with them. They should be employed as long as any degree of foreness or excoriation is perceptible in the course of the incisions ; for if they are withdrawn before

fore the sores are completely healed, new adhesions or contractions will very certainly ensue.

It sometimes happens from burns, as well as from the confluent small pox, that along with a contraction, or perhaps a total obliteration, of one or both nostrils, an adhesion is produced between the nose and the skin of the upper lip. In this case the adhesion of the lip to the nose should, in the first place, be separated by slow dissection with a scalpel; and the sore thus produced should be perfectly healed and firmly cicatrised before any attempt is made to open the nostrils. It is scarcely necessary to remark, that, during the cure, the sore should not only be kept properly covered, but, with a view to remove any improper contraction which the lip may have acquired, it ought at each dressing to be tied down by several turns of a double headed roller passed round and over the head.

## SECTION V.

### *Of POLYPI in the NOSE and THROAT.*

**T**HE internal surface of the nose is liable to excrescences, which, from their form being supposed to resemble that of insects of this name, have commonly been termed Polypi. Every part of the nasal cavity, and of the back part of the throat, is liable to these excrescences; but most frequently they originate from that part of the membrane of the nose which lines or covers the ossa spongiosa. In general they are confined to one side of the nose, and they do not commonly appear so far back as the throat; but in some instances they occupy both nostrils, and in others they are so large as to be distinctly perceived on looking through the mouth into the pharynx. In some cases, indeed, they are found to originate from the pharynx.

The first warning which a patient commonly receives of this disease, is a partial loss of smell, attended  
with

with a sensation of fulness or obstruction in some particular part of the nose, very similar to what is experienced from the stuffing of the nostrils in a common cold or catarrh. This continues to increase, till a small tumor or excrescence is perceived in one, and sometimes in both, nostrils; which in some instances never descends farther than to be merely perceptible when the head is somewhat elevated; while in others it falls a considerable way down upon the upper lip, and at the same time perhaps pushes back into the throat.

In some, this elongation of the tumor continues steady and permanent, but in most instances the swelling retracts altogether within the nostrils in dry weather, and protrudes only in rain; and more especially in thick hazy weather. Indeed, the influence of weather on the size of these excrescences is often astonishing. I have known some patients who in clear dry weather were not known to labour under the disease, in whom the swellings always protruded to a considerable length on the least tendency to a damp atmosphere.

Excrescences of this nature are of various degrees of firmness. A great proportion of them are soft and compressible, but in some instances they are extremely firm; and at last have been known to acquire even a cartilaginous kind of hardness. Both kinds of them are apt to bleed on being fretted or roughly handled; But it is those of a soft spongy nature only which are so remarkably affected by the weather, the firmer or fleshy kind of polypi being seldom or never influenced by it.

The colour of these excrescences is likewise variable: For the most part they are somewhat pale and transparent, but in some instances they are of a deep red colour; and, so far as I have yet had opportunities of observing, I would say, that there is some connection between the colour and consistence of them. The experience of others may lead to a different conclusion; but in the course of my observation it has  
uniformly

uniformly happened, that the soft compressible polypus has been of a pale complexion, while those of a firmer texture have always been of a deep red.

In the commencement of this disorder, the pain attending it is always inconsiderable; and in the softer kinds of it there is seldom much pain, even in its most advanced stages. But those of a harder nature in general become painful as they increase in size, particularly on any cause of irritation being applied to them. In some instances, they become unequal and ulcerated over their whole extent. In this state, considerable quantities of a thin fetid matter are discharged; and if a cure be not obtained by extirpation, they are now very apt to degenerate into cancer. It is proper to observe, however, that it is the firm fleshy kind of polypi only which are apt to become cancerous, and that this change rarely or never happens with those of a softer texture.

But although the softer kinds of these swellings very seldom terminate in cancer, and are rarely productive of much inconvenience in the early stages of the disease, or as long as the excrescences are confined to either of the nasal cavities; in the latter stages of the disorder, they are often attended with a great deal of distress. Besides the trouble and perplexity which occurs from their falling down upon the lip, they sometimes pass so far back into the fauces, as not only to impede deglutition, but to obstruct respiration; and in some instances the tumors become so large, as not only to distend the softer parts of the nostrils, but to elevate and even to separate and dissolve the firm bones of the nose. This, indeed, is not a common occurrence; but every practitioner must have met with it: I have seen different instances of it.

Various opinions are met with in authors of the cause of polypous excrescences. By some they are said to depend most frequently upon a scrophulous taint; while others imagine, that a venereal infection often gives rise to them.

We will not say that swellings of this kind do not, in some instances, occur along with the venereal disease and scrophula. They may even be met with as symptoms of these diseases. But in such instances we would consider the general taint of the system in no other light than as an occasional or exciting cause of the local affection, for in almost every case of polypus a local injury may be traced as the cause of it; and from every circumstance relating to the disease, we conclude, that it is always of a *local and circumscribed* nature. For even where a polypus originates from a venereal infection, this particular symptom is so far of a local nature, that it remains *fixed and permanent* after the general taint of the system is completely removed.

All the harder kinds of polypi we suppose *may originate* from the same causes which produce *tumors of a similar texture* in other parts of the body; but in most instances they appear to be connected with, and even to proceed from, a caries of the bone underneath; and it is this chiefly which renders them more hazardous and much more difficult of cure than those of a softer nature, which, in general, we imagine are produced by a mere distention or relaxation of the membrana Schneideriana. When any portion of this membrane becomes inflamed, either by the effects of cold, or from external violence, if in this state any part of its surface is ruptured or eroded, as frequently happens from picking or blowing the nose too forcibly, a degree of weakness or relaxation is thus produced, which is apt to terminate in a fullness or prominency of the parts immediately affected; and this being increased by every succeeding cold, the disease we are now considering comes in this manner to take place.

The farther progress of the disease may depend on various causes; but in general it will advance quickly or slowly, according as the parts affected are more or less liable to inflammation. Thus I have known various instances of polypi of this kind remaining small  
and

and perfectly stationary for a great number of years, when the patients have not been obliged to be much exposed to the open air ; while it commonly happens, among the poorer class of people, who are exposed to every inclemency of weather, and who are therefore more liable to frequent returns of catarrh, that the disease advances with much more rapidity.

In the treatment of every disease, it is a matter of much importance to be able to form a just prognosis, not only of the manner in which the symptoms may probably terminate, but of the effects to be expected from the different remedies that may be employed for them ; and in no instance is this a more desirable object than in the management of polypous excrescences of the nose.

By some writers upon this subject, we are led to conclude, that polypi are always of a doubtful nature with respect to the event or termination of them : That for the most part they are even of a dangerous nature ; and therefore that we ought to consider every person in whom they occur as in a hazardous state : Whilst others assert, that although they may occasionally be productive of some inconvenience, yet that they are seldom attended with any kind of risk.

Some, again, are so extremely timid with respect to polypi, as to suppose that they ought never to be meddled with ; and alledge, that there is more chance of doing harm than good by any operation we can employ for removing them ; whilst by others we are told that they may be taken away with safety.

This difference of opinion respecting the nature of polypi, and of the effects to be expected from the remedies employed for them, has arisen in a great measure from authors not having distinguished the different kinds of these excrescences with such precision as they ought to have done : For while in one variety of the disease there is little risk to be dreaded, and no great cause to doubt of our being able to remove it ; in others there is undoubtedly a good deal of hazard, and  
much

much reason to fear that no remedies whatever will prove effectual in preventing a return of it.

We have already observed, that these tumors are of various degrees of consistence ; and from all the experience which I have had in the treatment of them, I am led to conclude, that in general the risk with which they are attended is nearly in proportion to their firmness. The soft compressible kind of polypi are not only less painful than the others, but the removal of them may at any time be attempted with more safety. Indeed they are not commonly attended with pain ; and it seldom happens that any material inconvenience occurs from the extirpation of them : But the firm fleshy kind of polypi are in general not only painful, but are much more apt to return after being extirpated. In forming an opinion, therefore, of the probable event of them, this circumstance of texture deserves particular consideration. In a soft, yielding polypus, if the constitution is healthy, we may, perhaps in every instance give a favourable prognosis : for, as long as the disease remains of a moderate size, there is seldom any inconvenience experienced from it, and therefore there is no necessity for meddling with it ; and again, when by acquiring a great additional bulk, the removal of the tumor is rendered necessary, it may always be undertaken with much probability of success. But, on the contrary, in polypi of a fleshy consistence, and especially in tumors of even a firmer texture than this, the patient or his friends ought always to be informed of the risk being considerable : for it frequently happens that excrescences of this kind cannot be entirely removed ; and even when this is easily and completely practicable, they are apt to regenerate, and in some instances, as we already observed, to become cancerous. In all such cases, therefore, a guarded prognosis ought to be given ; otherwise, if the disease should afterwards return, the operator would be justly blameable, at the same time that the operation itself would fall into discredit.

Indeed

Indeed some practitioners are so averse to this operation in all cases of firm or hard polypi, that they always decline to meddle with them. As long as they remain stationary, and are not attended with pain, if they do not obstruct the breathing or deglutition, they ought not to be touched: But whenever they become painful, and especially when they have acquired such a bulk as to obstruct either the passage to the stomach or lungs, we ought certainly to endeavour to extract them, if this be not already rendered impracticable by their adhering through the whole of their extent to the bones of the nose, and by these being rendered carious; which they are apt to be in the late stages of this disorder.

All the softer kinds of polypi which are liable, as we have already described to be affected by the state of the weather, may frequently be prevented from acquiring any additional bulk by the use of astringent applications, particularly by a strong solution of alum, a decoction of oak bark, or the application of vinegar or ardent spirits. By one or other of these being applied from time to time over the surface of the tumors, I have known different instances of their continuing for a great length of time to give no kind of disturbance; and, in some cases where the remedy has been freely employed, they have even shrivelled and become considerably smaller. It must be acknowledged, however, that they have never accomplished a cure; but it is a matter of no small importance our being able by gentle means to render any painful operation unnecessary.

On the first appearance, therefore, of a polypus, we ought by a free use of some astringent application to endeavour to prevent its farther increase; but when these do not succeed, we are to consider by what mode the tumor may be most effectually removed.

Various methods have been proposed for the removal of polypi: namely, the use of caustic or corroding applications—the actual cautery—the passing  
of

of a seton or cord through the diseased nostril—excision with a scalpel or scissors—the application of a ligature round the neck of the tumor—and evulsion or extraction by a proper application of the forceps.

An ignorance of the circulation of the blood, and of the easy method with which we are now acquainted of putting a stop to hemorrhagies, led in earlier times to the practice of removing tumors, wherever they were situated, by corrosive applications, and even by the use of the actual cautery. If this practice was considered as necessary in other parts of the body, it is not surprising to find it proposed for the removal of polypi in the nose, where the effects of hemorrhagies were more dreaded. Cauterising irons were therefore invented for this purpose, together with metallic tubes for conducting them. But even with the utmost attention there is no possibility of destroying the diseased parts without injuring those that are sound. Remedies of this kind are therefore more apt to do harm than to produce any advantage; so that they are now very generally laid aside; as are likewise all kinds of corroding applications, which are equally liable to uncertainty, by their being apt to spread to the contiguous sound parts in the cavity of the nose and throat.

As it has been imagined by some practitioners, that excrescences of this kind may be removed by inducing a suppuration upon them, it has been proposed to insert a cord of silk or cotton into the diseased nostril, and one end of it being taken out at the mouth, by daily drawing it back and forward, and by covering that part of it which comes into contact with the tumor, with a slightly irritating ointment, thus to create some degree of inflammation and consequent suppuration over it.

We will readily allow, that in this manner a plentiful flow of matter may be excited; but it is not probable that this can have much influence in diminishing the size of the tumor. Till of late, indeed, it was commonly imagined that the formation of pus is nec-

essarily attended with a dissolution of the solid parts in which it occurs. Upon this principle Mr. Daran and others have endeavoured to explain the operation of bougies in obstructions of the urethra; and a similar idea suggested the remedy of which we are now speaking, in polypous excrescences of the nose. But it is now known, as we have elsewhere fully shown, that the dissolution of solid parts is by no means necessary for forming pus. It is also known, that in diseases of the urethra, bougies prove effectual only by their form, and by the pressure which they produce; and we have no difficulty in saying, that it is in this manner only by which a cord, if it ever proves useful, can have any effect in removing polypi of the nose. As the passage of the nostrils is very unequal, being wider in one part than another, and as the roots of polypi are frequently so situated that no pressure can be applied to them, we are not of opinion that they can ever be removed by a cord passed through the nose, as many have imagined. But after the extirpation of polypi in the manner we shall afterwards point out, when their roots are not entirely removed, there can be no impropriety in our endeavouring in this manner to clear the passage more effectually. It was for this purpose solely, we may remark, that the practice we are now considering was originally proposed by that judicious observer Monsieur Le Dran. But although it might, in this manner, sometimes prove useful, yet from being a troublesome and disagreeable application, it has seldom been employed. We shall have occasion however, in a subsequent part of this section, to speak of it again.

In other parts of the body, the removal of tumors by excision is universally preferred to every other method; and it would likewise be employed in polypi of the nose, were it not for their inaccessible situation. But it seldom happens that they are so situated as to render this mode of treatment practicable; for although scalpels and scissors of various forms have  
been

been invented for this purpose, the roots of polypi are in general seated so high in the nostrils, and the passage is for the most part so completely filled by the tumor itself, as to render it always difficult, and often impossible to remove them by excision.

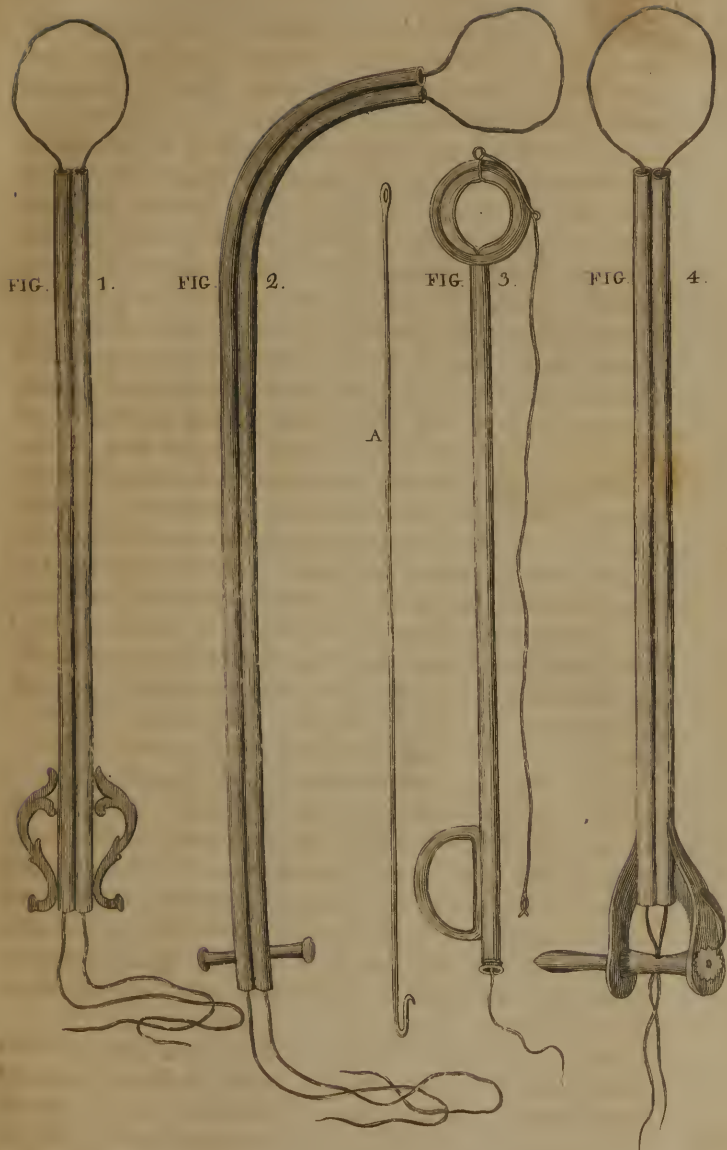
But when it is found that the tumor originates from the under part of the nostril, and when the point of a scalpel can be made to reach the root of it, we ought, without hesitation, to employ this method of taking it away, even in preference to that by ligature: for in this manner the whole of the tumor may be more effectually removed; and in this situation there is no reason to be afraid of hemorrhagies, as compression can be readily applied to any blood vessel that may be cut in the under part of the nostrils. We rarely find however, as has been already observed, that a polypus is seated so far down in the nostrils as to render this method of treatment practicable.

It therefore appears that all the means we have yet considered for the removal of these excrescences, are either inadequate for the effect, or altogether inadmissible; and hence we are under the necessity of employing either the method by ligature, or that by extraction with the forceps.

As the removal of a polypus, by tearing or twisting it off, is attended with much more pain than the application of a ligature round the neck of it, the latter would always have been preferred, if it had been considered as equally practicable. And as we now know that it can be done in a very safe and easy manner, it will probably in future be very generally employed. The method we allude to, is that which Monsieur Levrette of Paris first recommended a considerable time ago, for the removal of polypi in the vagina, and which we now find may be used with equal propriety in similar affections of the nose and throat. The following is the method of applying it in polypi of the throat.

Fig. 1. Plate XLIV. represents a piece of pliable silver wire passed through a double canula, and the wire should be long enough when doubled to pass through the nose into the pharynx. Let the wire be taken from the canula, and the doubling at the end of it be slowly and gently insinuated through one of the nostrils : As soon as it appears in the throat, the operator, with his fingers inserted into the mouth, must open the double sufficiently for passing it over the pendulous extremity of the tumor ; and having pressed it down to the neck or root of it, the two ends of the ligature hanging out at the nostril must be again passed through the canula ; which is now to be inserted into the same nostril, and pushed back along the course of the wire till it comes into contact with the root of the polypus. The fingers should still be continued in the throat to preserve the ligature in a proper situation ; and the canula being placed in the manner we have directed, the wire must be drawn tolerably tight ; and the ends of it being fixed on the wings or handle of the canula, as in Plate XLV. fig. 1. it must be left in this situation till the following day, when being again drawn somewhat tighter, and this being daily repeated, the tumor will fall off sooner or later according to its size. When the excrescence is small, it will probably drop in the course of the second day ; and tumors of even a large size will come away on the third day. It is better however to make the compression in a more gradual manner : for when the wire is drawn with much force, instead of acting as a ligature, and removing the tumor by compression, it removes it too quickly, by cutting it across, and may thus be equally productive of hemorrhagies as if the operation had been done with a scalpel.

In this manner all those polypi may be removed which either originate in the throat, or which proceed back from the nostrils into the fauces ; and the practice may be extended even to those which are deeply seated in the pharynx, if the ligature can be properly applied





applied over them either with the fingers ; with the assistance of forceps ; or with an instrument such as is delineated in Plate XLVI. fig. 3. Some instances indeed have occurred of excrescences seated too far down in the œsophagus for admitting of ligatures being applied upon them in this manner ; nor is it admissible, even where the upper part of the tumor is accessible, if the base or neck of it be so low down as to prevent the ligature from being applied to it. In the third Volume of the Physical and Literary Essays of Edinburgh, there is a case related in which a very ingenious method was put in practice by the late Mr. Dallas for surrounding a deep seated polypus with a ligature ; and although instances of such excrescences are extremely rare, yet as they are sometimes met with, I think it right to give a delineation of the instrument which in this instance was successfully employed.

In this case both the breathing and deglutition were much impeded by a large fleshy excrescence originating in the œsophagus, a considerable portion of which was thrown into the mouth by every exertion to vomit ; but it soon retracted and remained perfectly concealed within the pharynx till vomiting or retching was again excited. This portion of the tumor which occasionally protruded, was entirely removed by the method we have mentioned, and which we have more particularly described in the explanation to Plate XLVII. By this means the patient was relieved from much inconvenience and distress ; but another branch of the tumor which extended towards the stomach becoming afterwards very large, he died by the effects of it in about two years from the operation.

We think it right to remark, that this patient might probably have been saved by the use of the ligature and double canula such as we have described, and that in similar cases it is to be considered as perhaps the best means of relief. When a polypus is suspected to have formed in the œsophagus, if no part of it is observed to protrude up towards the pharynx, there will

be much cause to imagine that it proceeds down towards the stomach ; so that if the double of a piece of flexible wire be pushed down the œsophagus, the pendulous part of the tumor may very probably be laid hold of in withdrawing it ; or, if one attempt should fail, other trials may safely be made with it : And as soon as the double of the ligature is found to be firmly fixed, all that portion of the tumor which it surrounds may be easily removed by the application of the double canula in the manner we have mentioned. It is proper, however, to observe, that the ligature and canula should both be carried through one of the nostrils into the œsophagus ; for in this manner they will not prove nearly so inconvenient as when passed through the mouth, and they may be applied with equal ease and advantage. For this purpose the canula must have some degree of curvature, as is represented in Plate XLIV. fig. 2.

Ligatures may in general be applied round polypi of the back part of the nose and throat in the manner we have directed, without much interruption to the breathing ; but when they are deeply seated in the œsophagus, and on all occasions when the application of the ligature is difficult and tedious, it is proper to secure an easy and free respiration during the operation by previously advising bronchotomy. By this no additional risk is incurred, for it may with ease and safety be accomplished ; and it puts it in our power to finish the operation more perfectly than we otherwise could do. It is likewise proper to remark, that although the operation may often be done without any assistance from a speculum oris, yet whenever it proves tedious, and when the ligature cannot be applied with much ease over the tumor, this instrument ought to be employed.

We have now to mention the method of applying a ligature to a polypus seated in the anterior part of the nose, and which, instead of passing back into the pharynx, proceeds down one of the nostrils towards the  
upper

upper lip. Let the double of the ligature be passed over the most depending part of the polypus, and be slowly pushed up to the root of it with the slit probe Plate XLVI. fig. 2. The probe being given to an assistant to preserve the ligature in this situation, the two ends of it must be passed through a double canula; which being inserted into the nostril on the opposite side of the polypus, and being pushed easily along till it reaches the root of it, the ligature must now be drawn so tight as to make some impression on the root of the tumor, when the ends of it must be tied to the wings of the instrument, and must be daily pulled somewhat tighter till the tumor drops off.

In this manner every polypus in any part of the nose may be extirpated. Those who have not seen it put in practice may be apt to doubt of this assertion; but a few trials will show that it is not only the most effectual method, but the safest and easiest that has yet been proposed of removing every excrescence of this kind: And it has the advantage over every other method of applying ligatures upon polypi in the nose, of answering equally well in the large as in the smaller kinds of them—and it may even be applied where the tumor is so large as to distend the nostril to a considerable size. In Plate XLVI. fig. 1. there is delineated a remarkable form of a polypus extirpated in this manner under the direction of Dr. Monro, who was the first, I must observe, who put in practice this method of removing polypi from the nose and fauces.

This polypus filled the nostril completely; to such a degree indeed, that it could not have been removed in any other manner; not even with forceps, for the blades of the instrument could not have been inserted.

Besides this, another method has been proposed of applying ligatures round polypi in the nostrils: By introducing a ligature through the affected nostril into the throat, and passing it in such a manner that the doubling may include the root of the polypus, if the

opposite ends of it be taken out at the mouth, they may be sufficiently twisted, it is alledged, for removing the tumor.

In a few cases this might possibly answer, but it would often fail : I think it right, however, to mention it, as it is recommended by a very judicious practitioner, Mr. Cheselden. Fig. 2. Plate XLV. exhibits a representation of a polypus surrounded with a ligature in this manner.

Various forms of forceps have been invented for the purpose of removing polypi. Those that answer the intention best, and that are most generally used, are represented in Plate XLVIII. Those of a straight form are intended for extracting polypi by the anterior nares, and the crooked forceps are employed by some practitioners for the removal of those excrescences which pass into the throat behind the uvula. We have shown indeed that polypi of this kind may be more easily removed by ligature, but we think it right to delineate such forceps as are used by those who prefer a different method.

In proceeding to extract a polypus with forceps, the patient ought to be firmly seated, with his head leaning back and supported by an assistant behind ; and as it is of much importance our being able to discover as nearly as possible the origin of the excrescence, some advantage may be obtained from the face being placed in such a manner that the light of a clear sun may fall into the nostril.

In the ordinary method of performing this operation, the surgeon now takes the forceps, fig. 2. Plate XLVIII. and inserting one of the blades on each side of the polypus, he carries them easily along till he brings their points as near as possible to the neck of it, when he lays hold of it firmly, and endeavours to extract it entire, either by pulling directly downwards, or by moving the forceps from one side of the nostril to another ; or, as some more properly advise, by turning or twisting the polypus round till it is completely

PLATE XLV.

FIG

1.



FIG. 2.

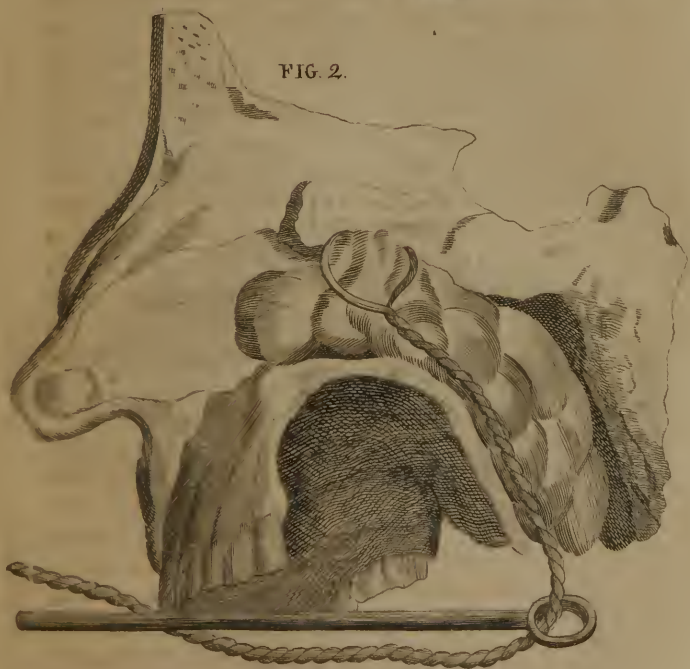






PLATE XLVI

FIG. 1

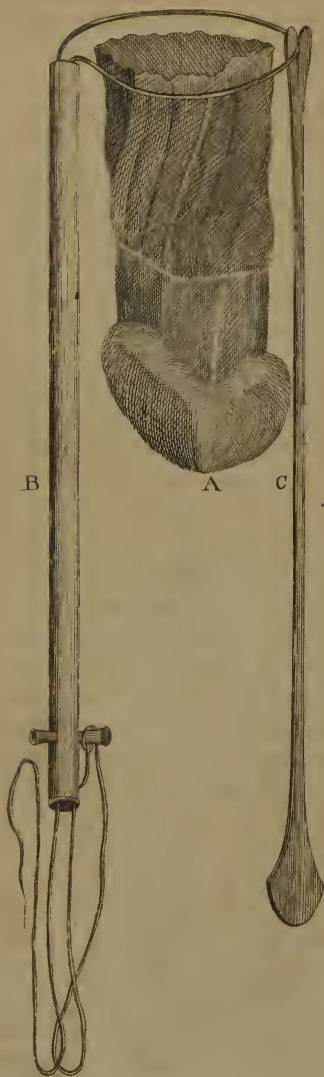
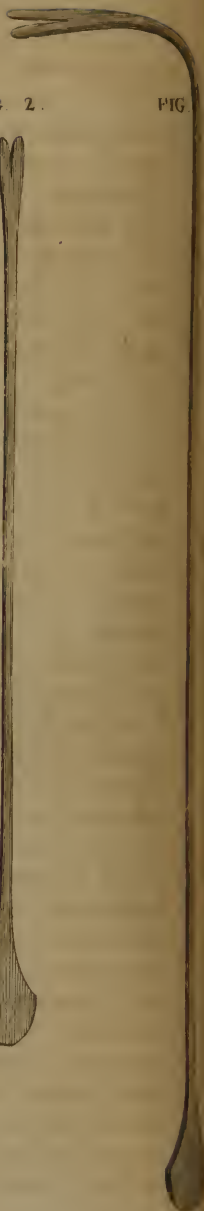


FIG. 2.

FIG.



pletely separated. By this last method I think it probable that the root or attachment of the excrescence will be more readily loosened than in any other way, at the same time that that part of the lining membrane of the nose will not be so much injured as when the tumor is tore away by being pulled either in a lateral direction or perpendicularly downwards.

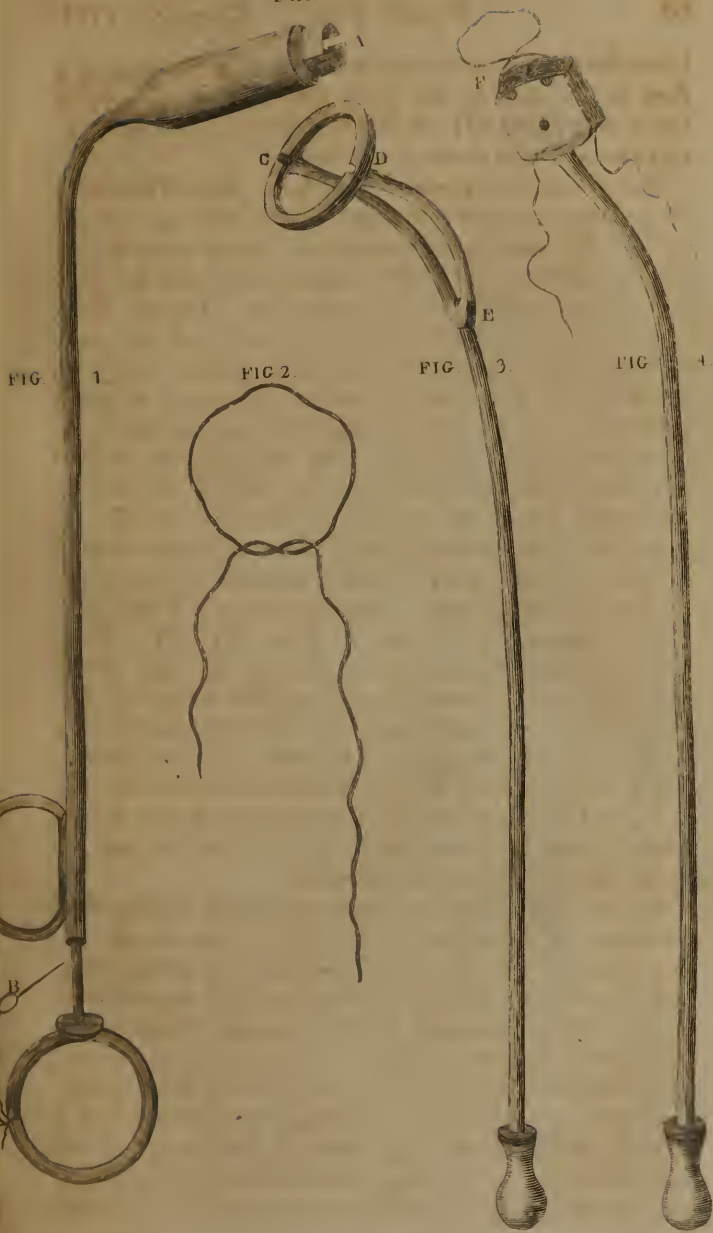
When a polypus is of a tolerably firm texture, if the operation be properly conducted, we may frequently be able to bring it all away at once : but when it is very soft and yielding, it commonly requires repeated applications of the forceps ; and we should never desist as long as any portion of the excrescence remains which can with propriety be removed.

It is proper, however, in this place to observe, that the first application of the forceps is commonly attended with such a considerable discharge of blood, that beginners are apt to desist before the operation is nearly finished, from their being afraid of fatal consequences from the hemorrhagy ; but this ought not in general to be regarded, as long as by a farther use of the forceps we can extract any more of the polypus. And even when the operation is finished, if the patient is in any degree robust and plethoric, some advantage may be derived from our admitting of a farther discharge, by which inflammation may be prevented, which otherwise might be productive of troublesome consequences. The hemorrhagy, however, ought not to be allowed to proceed so far as to run any risk of hurting the patient. This, indeed, is not a frequent occurrence ; for it does not so readily happen as is commonly imagined by those who have not had frequent opportunities of seeing this operation put in practice. I will not pretend to say, that instances may not occur of more blood being lost by this operation than is proper ; but I can safely assert, that it is not a common occurrence. When it is found, however, that the hemorrhagy is proceeding too far, we ought immediately to employ those means which we  
know

know from experience are most effectual in putting a stop to it ; but as we have already treated fully of them in Section III. of this Chapter it is not necessary to enter upon them at present.

As it sometimes happens that some parts of the roots of polypus are not extracted by the forceps, we are desired by some practitioners to destroy them by inserting caustic or corrosive applications into the nostrils immediately after the operation. Unless, however, we can evidently see the part on which the caustic should be applied, I am clearly of opinion that this practice should not be adopted ; for otherwise we must work entirely at random, and will more probably do harm than good. But when, by exposing the nostril to a clear light, we can bring the seat of the excrescence into view, we may with propriety touch any parts of it that remain with a piece of lunar caustic properly covered with a canula, in order to protect the contiguous sound parts. An instrument for this purpose is represented in fig. 1. Plate XLVII. This, however, should not be attempted on the day of the operation, as is commonly advised ; for while any discharge of blood continues, we cannot obtain such a clear view of the parts affected as is necessary : But it may properly enough be done on the following day ; and the application of the caustic should be repeated every second or third day, as long as any remains of the polypus are observed.

When, again, the root of a polypus lies so deep that it cannot be discovered, if we find, either by the introduction of a probe, or by the breathing through this nostril not being sufficiently free, that the excrescence is not entirely removed by the forceps, although, for the reasons mentioned above, we are averse in this situation to the application of caustic, it may be extremely proper to endeavour to destroy it by means of a more harmless nature. In this case, the practice we have described, of passing a seton through the nostril into the throat might probably prove useful ; but the  
same





same intention may be accomplished with more certainty by the use of a large bougie. We have already had occasion to remark, that in the removal of obstructions in the urethra, bougies seem to operate chiefly by mechanical pressure ; and there is cause to imagine that upon the same principle they may be employed with advantage for the removal of those parts of polypous excrescences in the nostrils that cannot be taken away with the forceps. Nay more, were we consulted early in the disease, before the excrescence has acquired any considerable bulk, they might, I think, be successfully employed in preventing their farther increase ; and if duly persisted in, they might, in some instances, in this incipient state of the affection, remove them entirely. Practitioners, however, are seldom advised with, as has been already remarked, till the disease has gone too far to admit of this. I have only had one opportunity of trying it ; but in this case, the effects of it were such as to justify our putting it to the test of future experience.

The person in whom it was employed, had for several weeks complained of a kind of stuffing and interruption to breathing in one of his nostrils. On looking into it, I clearly saw and touched with the probe, a small, pale coloured, soft polypus, at a considerable depth. As it did not yet produce much inconvenience, I did not think of advising it to be extracted ; but considering it as a fit case for trying the effects of compression, a roll of bougie plaster of a proper size was introduced along the course of the nostril ; and being gradually increased in size, the passage through the nostril became clear and pervious ; and in the course of seven or eight weeks the excrescence disappeared almost entirely ; but the patient was at this time obliged to go abroad, and I have not since heard of him.

In the latter part of the treatment of this case a silver tube, covered with plaster, was employed ; by which the breathing went freely on ; and being of  
such

such a length as to pass entirely into the nostril, it was kept in with little inconveniency. The tube may be prevented from falling out or from passing back to the throat, by a piece of adhesive plaster connected with it being applied to the upper lip, or by fixing it to a piece of narrow tape passed round the head.

In describing the operation, I proceeded upon the idea of the forceps in common use being to be employed; and when the excrescence is small, they answer the purpose as well as any other: But when the polypus is so large as nearly to fill the nostril, they cannot be either easily or properly applied: for the two blades of the forceps being both introduced at once, they cannot but with much difficulty be pushed deep into the nostril already much obstructed; and the more they are pressed forward upon the excrescence, and the nearer it is brought to the axis of the instrument, the more widely the blades of it are necessarily opened at their extremities; by which the tumor cannot be so equally compressed, nor is there such a chance of extirpating the root of it by means of them, as if they were so constructed as to apply pressure equally through their whole length.

To remedy these inconveniences, several improvements have been proposed; but the best I have met with is one by the very ingenious Dr. Richter, of Göttingen. A representation of it is given in Plate XLVIII. fig. 3. This instrument may be used in the ordinary way by introducing both blades at once when the polypus is small; but when the tumor is large, it will be found to answer better to introduce the blades in the same manner as we do midwifery forceps by inserting them separately. One of the blades being carried slowly and cautiously forward along the course of the polypus, the other must in like manner be introduced at the opposite side of it, so that they may now be firmly locked together at the joint. The blades are accordingly made to separate easily, and to fix in  
such

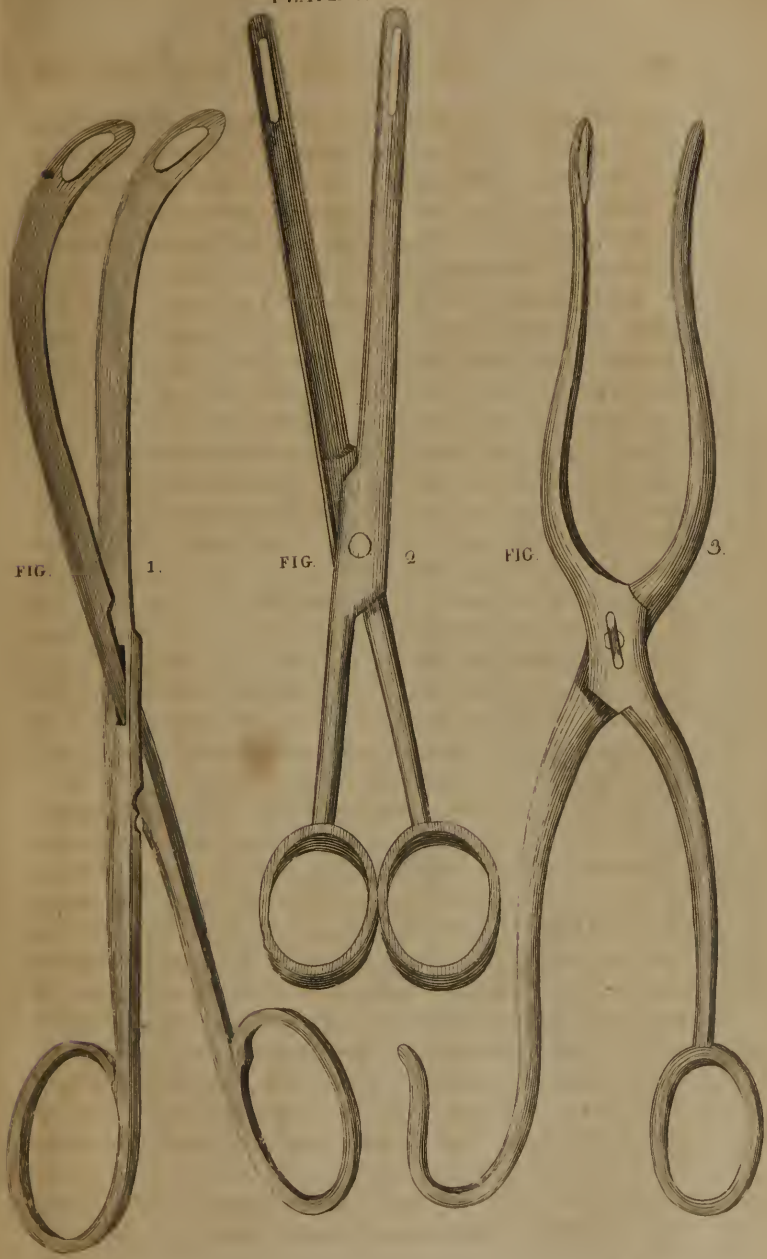


FIG.

1.

FIG.

2

FIG.

3.



such a manner as to admit of their being employed in the way we have directed.

These and every other variety of forceps employed for this operation, ought to be as thin and slender in that part of them which is inserted into the nose as the nature of the disease will admit ; for I must again observe, that the straitness of the part in which we have to operate, is one of the principal difficulties we have to encounter. But when the forceps are made of well tempered steel, they need never be so thick and bulky as they are commonly made.

When, however, polypi have acquired a large size, the obstruction they produce in the nostril is in some instances to such a degree, that even with this and every other kind of attention there is no possibility of inserting the forceps. In such circumstances, as a considerable space may be gained by laying the nostril open, it may in some instances be proper to divide the cartilaginous part of it by a longitudinal incision ; and after extracting the tumor, to reunite the divided parts either by adhesive plasters or with one or more futures.

At the same time, however, that I mention this, I think it right to observe, that it is a measure which ought in no instance to be hastily adopted ; but I also think, that it should not be universally condemned, as we find it to be by some practitioners. I do not imagine that it would in every case prove successful : but when a polypus has already become so large as entirely to fill the nostril ; when therefore no forceps can be inserted for removing it ; when the tumor is still continuing to increase ; and when of course there is much reason to suspect that it may terminate fatally if it be not extracted ; it will surely be better to give the patient any small chance that may be derived from the practice we have mentioned, than to leave him to die in misery ; which in all probability he would do were no attempt made for his relief. If on laying the nostril open, it is found that the tumor can be with  
safety

safety removed with the forceps, a complete recovery may possibly be obtained ; and thus the pain which the patient has suffered, and the trouble of the operator, will be amply rewarded, whilst at the same time no material injury will be done, nor no kind of risk incurred, if on laying the parts open it is discovered that no part of the tumor can with propriety be taken away.

In the firm fleshy kind of polypi, which in some instances degenerate into cancer, when it is found that the tumor is already ulcerated, and that the contiguous cartilages and bones of the nose are affected by it, it would no doubt be imprudent to advise the treatment we have mentioned, for no advantage would probably accrue from it ; the patient would be made to suffer a great deal of unnecessary pain ; and the operation itself would be brought into disrepute : but in the softer kinds of the disease, which rarely or never become cancerous, and when the more external bones and cartilages of the nose are not affected, we ought without hesitation to adopt it, when the tumor, as is here supposed to be the case, is meant to be removed with the forceps, and when this cannot be done in any other manner.

In the case of a firm fleshy excrescence, which filled the nostril so completely that the forceps could not be introduced for removing it, a method was put in practice by Dr. Richter for diminishing the size of the tumor ; which to a certain degree answered the purpose, and afforded considerable relief. A hole or opening was made through the centre of the excrescence by a common trocar, made red hot and covered with a canula, being pushed along the whole course of it. By this means a passage was formed through which the patient breathed easily, and the tumor was much lessened ; but the Doctor was unfortunately prevented from attempting to complete the cure either by extraction or otherwise, by the patient leaving the place. This case, however, affords an useful practical hint,

hint, and points out a mode of treatment which in tumors of this particular kind may in some instances be successfully employed.\*

I have thus described the method of extracting polypi of the nose with forceps ; but I must again remark, that they may be removed both with more ease and safety with the ligature : and as this mode of operating is admissible in perhaps every case that can occur, it seems only to require to be more generally known to be very universally preferred.

## S E C T I O N VI.

### *Of Extirpation of the TONSILS.*

**T**HE Amygdalæ or Tonsils are frequently, even in a natural state, so large as almost to fill up the passage from the mouth to the throat. As long, however, as they remain sound, and are not attacked with inflammation, any inconvenience produced by this is not commonly of much importance : but tonsils of this enlarged size are very apt to inflame on the patient being much exposed to cold ; and frequent returns of inflammation are often attended with such an addition of bulk as to produce nearly a total obstruction to the passage of food, drink, and air.

It is this enlarged state of the amygdalæ which in general is termed a Scirrhusity of the Tonsils ; but we think it right to observe, that the term Scirrhus appears here to be very improperly applied ; for, excepting the circumstance of a firm tumor, every other characteristic of scirrhus is in these affections of the tonsils very commonly wanting. A real scirrhus is attended with frequent shooting pains, and it is a swelling of such a nature as generally terminates in cancer : Now we know,

\* For a more particular account of this case, and of the forceps mentioned above, V. Augusti Gottlieb Richteri Observationum Chirurgicarum fasciculus secundus. Gottingæ, 1776.

know, that pain very seldom occurs in cases of enlarged tonsils, except from inflammation: while in an inflamed state, they are frequently indeed very painful; but as soon as the inflammation subsides, no more pain is experienced, and they remain perfectly easy and indolent till the patient is again exposed to cold. This, however, is never the case with swellings of the real scirrhus kind; for whenever they become painful, they uniformly proceed to turn worse: and, again, enlarged tonsils are seldom if ever known to terminate in cancer. I never knew an instance of their doing so; and few practitioners, I imagine, have met with it.

Mr. Sharpe, when treating of this subject, recommends a more frequent extirpation of enlarged, or what he terms Schirrhous Tonsils, than what has hitherto commonly prevailed; and he is induced to do so, from having observed that the disorder never returns, as it too frequently does after the extirpation of scirrhus tumors in other parts. His words being much in point, I shall transcribe them. "All other tumors of the scirrhus kind, whether of a scrophulous or cancerous nature, are subject to a relapse; the poison either remaining in the neighbourhood of the extirpated gland, or at least falling on some other gland of the body. In this case, I have never met with one such instance; and the patient has always been restored to perfect and lasting health."\*

Mr. Sharpe has here communicated a very interesting fact; which is rendered the more valuable, by coming from a man of character, and whose practice was very extensive. By many, however, the truth of it has been doubted, from its being universally known that scirrhus tumors frequently return in other parts of the body after being extirpated. It would, indeed be surprising to find the extirpation of scirrhus tonsils prove always successful when the same operation often fails when practised for similar affections in

\* V. Critical Inquiry, &c. by Samuel Sharpe. Fourth Edition, section VII.

in other parts. But the explanation we have given sets it in a more distinct point of view. These tumors of the amygdalæ, commonly termed Scirrhus Tonfils, are not of the true scirrhus nature; and hence it is that they never degenerate into cancer, or return after extirpation; and this is accordingly a very weighty argument for removing them as soon as they become so large as to impede either deglutition or respiration. Till this, however, takes place to a considerable degree, no practitioner ought to advise this operation; for, as it is attended with a good deal of pain, it ought to be avoided as long as the safety of the patient does not render it absolutely necessary; but whenever the tumor becomes so large as to produce much interruption to the passage of food and air, there should be no hesitation in recommending it.

Different methods have been recommended for removing enlarged tonsils. Some advise the repeated application of the actual or potential cautery: Others recommend excision with the scalpel or with crooked scissors: And, lastly, it has been proposed to do the operation by ligature.

Caustic applications, however, should here be considered as inapplicable, from the impossibility of using them without injury to the neighbouring parts; and we are debarred from the use of the knife and scissors by the profuse hemorrhagies which have sometimes occurred from excision. Necessity therefore obliges us to have recourse to the ligature; and with due attention we are able to remove every tumor by this method to which the amygdalæ are liable.

In the preceding section we have given a particular detail of the best method of applying ligatures to polypous excrescences of the throat, and it likewise appears to be the easiest and best method of forming ligatures upon tumors of the amygdalæ. It ought to be done with pliable silver wire, but catgut of a proper strength will likewise answer; and although the double canula to be passed through the nose might be of a

F straight

straight form, it will answer better if it be somewhat crooked, as in fig. 2. Plate XLIV.

The double of a ligature, formed of pliable silver wire or catgut, being inserted into one of the nostrils, must be pushed back till it reaches the throat, when the operator introducing his fingers at the mouth, must open the ligature; and having passed it over the tumor, it must now be pressed as much as possible down to the root of it. He must continue to preserve it in this situation with his fingers; while an assistant having inserted the two ends of the ligature into the canula, must push it easily along the nostril, till the farther end of it be either seen or felt in the throat; and the wire being now pulled so tight as to fix it in the substance of the tumor, the ends of it hanging out at the other extremity of the canula must be tied in the manner we have formerly directed, to the wings or handle of the instrument; and the ligature being made tighter from time to time, the swelling will soon fall off.

The more pendulous the tumor, the more easily will the ligature be fixed. But however broad the base of it may be, there will seldom much difficulty occur with it; for the swelling is always very prominent: so that when the double of the wire is fairly passed over, it may easily be pushed down to the base with the fingers; and being preserved in this situation till it is once made sufficiently tight, it will not afterwards be in any danger of moving.

We have advised the ligature to be first carried through the nose before being put over the tumor. It might indeed be inserted by the mouth; but in this manner much inconvenience would be experienced, from the ligature and canula hanging out at the mouth during the cure. This method, however, may be adopted when any difficulty occurs in the application of the ligature by the mode we have mentioned.

In affections of this nature, both tonsils are in general nearly equally enlarged: In some cases the removal of

of one of them will form a sufficient opening for the passage of the food ; but when it is found necessary to extirpate them both, it will be proper to allow any inflammation or tension that may have been induced by the first, to subside entirely before any attempt is made to remove the other.

This mode of applying ligatures upon these tumors, is in my opinion the best ; but it may often be done in a different manner. Let a ligature of a sufficient strength be formed of waxed thread ; and let this be carried round the tumor either with the fingers or with a split probe, such as is represented in Plate XLVI. fig. 3. A noose is now to be made upon it, and a knot of any degree of tightness may be formed on it by fixing one end of the thread at the side of the tumor in the throat with the instrument, fig. 2. Plate LI. while the other is firmly drawn with the other hand of the surgeon out at the mouth.

This method was first put in practice by Mr. Cheselden ; and it has since that period been recommended by Mr. Sharpe and others. In order to fix the ligature where the tumor is of a pyramidal form with a broad base, a needle with an eye near the point, such as is represented in Plate LI. fig. 3. was likewise proposed by Mr. Cheselden. A double ligature being put into the eye of the needle, the instrument is now to be pushed through the centre of the tumor near to its base, and the threads being disengaged with a pair of forceps, the needle must be withdrawn. In this manner two ligatures are to be formed, each of them being made to comprehend one half of the tumor by one of the threads being tied above, and the other below. The instrument, fig. 2. of the same Plate, is likewise necessary here.

Although it is proper to mention this method of fixing a ligature upon tumors of the tonsils with broad bases, it is not probable it will be often necessary. By employing the double canula it can never be needed, as by means of it such a degree of force can be applied

as will at once fix the ligature in the substance of the swelling : And I am the more confident of this from finding Mr. Sharpe of the same opinion, even when the operation was done in a manner by which the ligature could not be so firmly fixed as may be done with the double canula ; but even when performed in this manner, Mr. Sharpe observes, “ that he has never in one instance found it necessary to employ the double ligature recommended by Mr. Cheselden.”\*

By whatever method, however, the operation is performed, it may in some instances happen that the tumor does not fall off by the first ligature ; in which case another must be applied, and continued till the cure be completed.

## SECTION VII.

### *Of the Extirpation of the UVULA.*

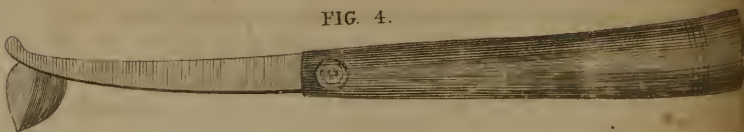
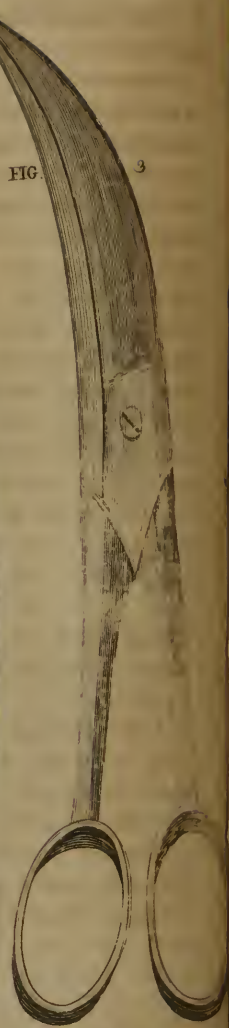
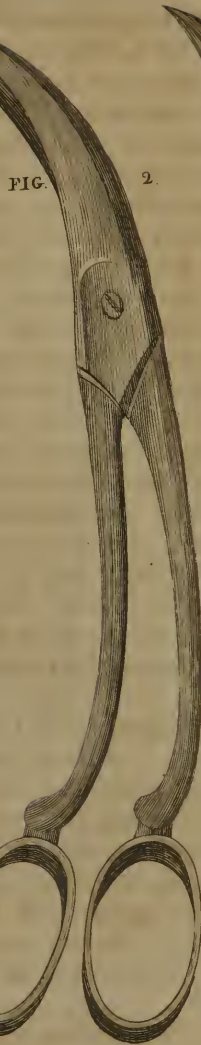
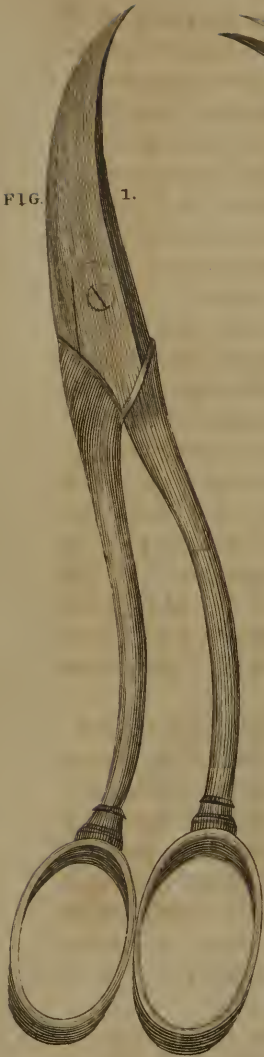
THE uvula, by frequent attacks of inflammation, as likewise perhaps by other causes, becomes in many instances so relaxed and elongated as to be productive of much distress, not only by impeding deglutition, but by irritating the throat so as to induce cough, retching, and even vomiting.

Any slight degree of enlargement of this part may in general be removed by the frequent use of astringent gargles, composed of strong infusions of red rose leaves—of Peruvian bark—or of oak bark, with a due proportion of alum or of the vitriolic acid : And as long as remedies of this kind are found to prove effectual, no other should be advised. But when these fail, and when the tumefaction of the uvula is so considerable as to create much uneasiness in the throat, along with any of the forementioned symptoms, we must depend on extirpation alone for the removal of them.

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\* Vide Mr. Sharpe's Treatise on the Operations of Surgery, chap. xxxii.





The uvula may be extirpated either by excision or by ligature. By the first, the parts affected are quickly removed, and the patient obtains immediate relief; whereas the other is more slow in effecting the same purpose, and is applied with difficulty. But by excision troublesome hemorrhagies sometimes occur, while no risk whatever ensues from the use of a ligature. Some practitioners indeed allege that no danger can ensue from any hemorrhagy that may take place in consequence of the excision of the uvula; but although this may in general be the case, yet I know from experience that instances of the contrary sometimes occur, and that very considerable quantities of blood have been lost by this operation. This will most readily happen where the uvula is much enlarged, and where of consequence the vessels with which it is supplied are in an enlarged state. Where the uvula is merely elongated, there will seldom, I imagine, be any risk of removing it by incision. In this state, therefore, of the disease, excision should be preferred; but when the parts to be removed are much increased in bulk, it will be better to make use of the ligature.

Different instruments have been invented for cutting off the uvula. One of these, which has been most frequently used, is represented in Plate LII. fig. 1. But neither this nor any other we have met with answers the purpose so well as a curved probe pointed bistoury, such as is delineated in fig. 3. of the same Plate. Or the operation may be very easily done with a pair of scissors of the common form, or with a curve, such as is represented in Plate XLIX. fig. 1. 2. or 3.

When any of these instruments are to be employed, the mouth should be secured with a speculum oris, such as is represented in Plate LIV. fig. 1; and the uvula should be laid hold of with a pair of small forceps, or with a sharp hook, by which it will be more easily cut off than if it were left hanging loose in its

natural situation. After the operation, if much blood be discharged, it may be restrained by the use of an astringent gargle ; by the application of ardent spirits ; or even by touching the bleeding vessel with lunar caustic. It will seldom happen, however, that any precaution of this kind is necessary ; for a moderate flow of blood will never do harm, and more than this will rarely occur where the parts are not much enlarged. When, again, the ligature is to be employed, the mode of fixing it described in the last section may be adopted : It may be done by the double canula passed through one of the nostrils ; or the canula may be introduced at the mouth ; or it may be done by the method employed by Mr. Cheselden for applying ligatures upon the tonsils, which is likewise described in the last section. After passing the ligature round the tumor, which in general will be easiest done with the fingers, a knot may be tied upon it in the manner we have there directed, with the instrument, fig. 2. Plate LI.

I have likewise thought it right to represent another instrument, which hitherto has been almost the only one employed for fixing a ligature upon the uvula, Plate XLIV. fig. 3. From the name of the inventor, it has commonly been termed the Ring of Hildanus. The invention is very ingenious ; and by means of it a ligature may be firmly applied upon the uvula : but the same intention may be accomplished in a more simple manner by either of the other methods described above ; so that this will probably be laid aside.

## S E C T I O N VIII.

### *Of Scarifying and Fomenting the THROAT.*

**I**T frequently happens in inflammatory affections of the amygdalæ and contiguous parts, that scarifications are found necessary ; in the first place, for lessening  
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ing the degree of inflammation by inducing a topical discharge of blood ; and afterwards for the discharge of matter contained in abscesses, when suppuration has not been prevented by the means usually employed for this purpose.

In Vol. II. Plate XXIV. I have delineated an instrument for this purpose ; and other two of different forms are represented in Plate LIII. figures 1 and 3. The wings with which fig. 1. is furnished are particularly well adapted for compressing the tongue, while the scarificator is employed in the back part of the mouth. By either of these, as well as with the other, in Plate XXIV. scarifications may be made, or abscesses may be opened, in any part of the mouth or throat with perfect safety.

In the treatment of inflammatory affections of these parts, we often find it necessary to recommend fomentations ; a remedy, too, which proves frequently highly serviceable in catarrhal affections of the trachea and lungs. Various methods are proposed for conveying warm steams to these parts ; but the best we have ever seen, and it is likewise the neatest and most simple in its construction, is the instrument delineated in Plate LIII. fig. 2. the invention of Mr. Mudge, of Plymouth. By means of it, the throat, trachea, and lungs, may be very effectually fomented by drawing warm steams into them, and without any difficulty or inconvenience to the patient, who may lie in bed during the whole operation. This instrument I consider as so highly useful in the treatment of every case of catarrh, that I think every family should be possessed of it.

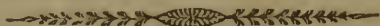
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## CHAPTER XXIX.

### *Of DISEASES of the LIPS.*



#### SECTION I.

##### *Of the HARE LIP.*

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**N**ATURAL deficiencies are not so frequently met with in any part of the body as in the lips. Children are often born with fissures in one of the lips, particularly in the upper lip. In some instances this is attended with a considerable want or real deficiency of parts ; in others we only meet with a simple fissure or division of them ; whilst in some again, there is a double fissure with an intermediate space left entire between them. Every degree of this affection is termed a Hare lip, from a resemblance it is supposed to bear to the lip of a hare.

For the most part this fissure or opening is confined to the lip itself : but in many instances it extends backward along the whole course of the palate, through the velum pendulum and uvula into the throat ; and in some of these the bones of the palate are either altogether or in part wanting, while in others they are only divided or separated from one another.

Every degree of the hare lip is attended with much deformity. It sometimes prevents a child from sucking. When in the under lip, which is not, however, often met with, it is commonly attended with inability to retain the saliva, and it is always productive of some degree of impediment of the speech ; and when the division extends along the bones of the palate, the patient

tient is much incommoded both in chewing and swallowing, by the food passing readily up to the nose.

These are all very urgent reasons for our attempting a cure of this affection as early as possible. Indeed, when sucking is interrupted by it, the child must either be fed by the spoon, or the operation must be done immediately. By practitioners in general we are desired at all events to delay it to the third, fourth, or fifth year; on the supposition, that the crying of the child will either render it altogether impracticable, or that the means employed for obtaining a cure will be thereby rendered abortive.

This reason, however, does not appear to be of much importance; for till the child arrives at his twelfth or fourteenth year, when we may suppose him to be possessed of sufficient fortitude for submitting easily to the operation, the same objection will be found to hold equally strong: Nay, a child of six or eight years of age is in every respect more difficult to manage than one of six, eight, or twelve months. I am therefore clearly of opinion, that in a healthy child the operation should never be long delayed; for the more early it is performed, the sooner will all the inconveniences produced by the disease be obviated; and so far as I can judge from my own experience, I think that it may be done even in very early periods of infancy, perhaps in the third or fourth month, with the same prospect of success as in any period of life. I have done it in the third month with very complete success.

Practitioners all agree with respect to the intention of this operation, which is accomplished by cutting off the sides of the fissure so as to reduce it to the state of a recent wound through the whole extent of it; and this being done, the sides of the newly divided parts are drawn together and retained in contact till a firm adhesion takes place between them. But although the principles on which our practice is founded are universally

versally admitted, authors have entertained very opposite opinions of the best method of carrying it into execution. By some we are directed to employ the interrupted suture for retaining the sides of the fissure; others prefer the twisted suture; whilst by many, sutures of every kind are said to be improper; and that a cure may be always obtained by the use of adhesive plasters, or by proper bandages; by which means a great deal of pain, they allege, may be prevented, which sutures are always sure to occasion.

This is a point of much importance, and therefore merits particular discussion; and more especially as it has been warmly contested even by surgeons of reputation.

In the treatment of every disorder, it is our principal object to obtain an effectual cure; but every practitioner will allow, that the easiest mode of effecting this, ought always to be preferred. On this principle much pains have been taken to show, that sutures are seldom necessary in wounds of any kind, especially in the treatment of the hare lip; and in support of this opinion various cases are recited of cures being effected with bandages alone: Nay some have gone so far as to assert, that in every instance of a hare lip a cure may be accomplished with more certainty by means of a proper bandage than when sutures are employed; for they allege, that the irritation produced by sutures serves in a great measure to counteract the very purpose for which they are intended. After the edges of the fissure are cut off or rendered raw, the contraction of the adjoining muscles is the only difficulty which we have to encounter: and this, we are told, instead of being removed by sutures, is universally increased by them; while the same intention, it is said, may be effectually accomplished with out any inconvenience whatever, by a bandage applied in such a manner as to keep the parts intended to be united in close contact, which it does by supporting the contiguous parts  
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PLATE L.



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so as to prevent the reaction of the muscles connected with them.

That a hare lip may be as completely cured with the uniting bandage, or with adhesive plasters properly applied, as by futures, we have no reason to doubt; and as this method of treatment is attended with less pain than the other, it ought in every case to be preferred if it could be relied on with equal certainty: But although by this means we might with much pains and attention be able in many instances to accomplish a cure, yet from the nature of the remedy there is much reason to imagine that it would frequently fail; for in the cure of the hare lip, if every point of the parts intended to be united be not kept in close contact till a complete adhesion takes place, our intention is always frustrated, and nothing will afterwards prove successful but a repetition of the operation in all its parts. The edges of the sore must be again rendered raw, and the patient must submit either to another application of the bandage, or to the use of futures; which, if employed at first, might have saved much trouble both to himself and to the operator: For it is proper to observe, that in cases where the operation is applicable, the method of cure by futures, when rightly conducted, never fails, at least I have never known an instance of it. It sometimes happens, indeed, that the deficiency or retraction of parts is so great as to render it impossible by any means to keep them in contact; and if futures are employed in cases of this kind, they will no doubt prove unsuccessful: This, however, is not the fault of the remedy, but of the operator, in using it in an incurable variety of the disease.

As I have had often occasion to put this operation in practice, and being at first prepossessed in favour of the method of cure by bandages and plasters, I gave them both a fair trial; and the result was what I have mentioned. I found, that by this method a complete cure might in some instances be obtained, but that the  
greatest

greatest care and attention could not insure success; and finding that disappointments never occur from the use of sutures when they are properly employed, I have now laid every other method aside; and hitherto I have had no cause to regret my having done so. I shall therefore proceed to describe the operation as it is performed when sutures are employed; and as none of the methods of treatment by bandages will ever probably be received into general use, it would be considered as superfluous to give an account of them: And besides, our doing so seems to be altogether unnecessary, as the subject has already been fully treated of by various authors of reputation, particularly by Monsieur Louis of Paris, who has given a paper in the 4th Volume of the Memoires of the Royal Academy of Surgery, which contains every argument that has been suggested in favour of the method of curing the hare lip by means of bandages.

In proceeding to the operation, the patient, if an adult, should be seated opposite to the light, with his head properly supported by an assistant; but if a child, he will be more firmly secured if laid upon a table, and kept in a proper posture by an assistant standing on each side.

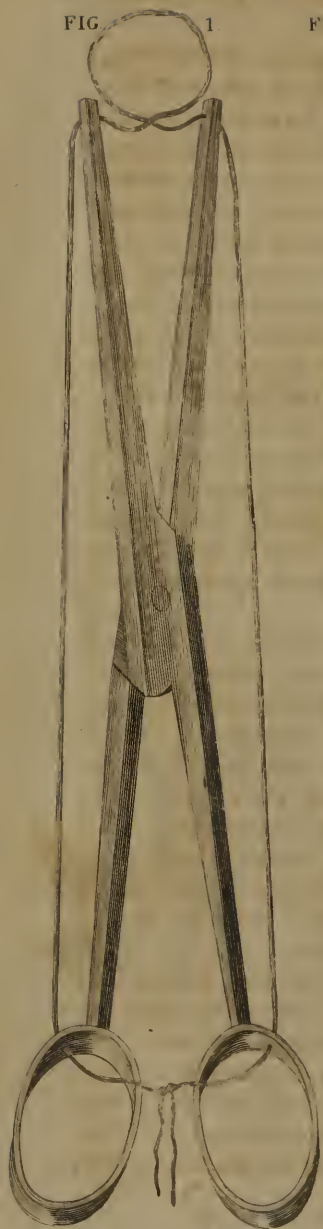
The operator is now to make an attentive examination, not only of the parts to be removed, but of those to which they are contiguous. The upper lip ought to be completely separated from the gums beneath, by dividing the frenum which conjoins them. This admits of the lip being more equally stretched; and when one of the fore-teeth is found opposite to the fissure, if it projects in any degree, as is sometimes the case, it ought to be taken out, as it will irritate and stretch the parts if it be allowed to remain. In some instances too, especially when the fissure runs through the bones of the palate, a small portion or corner of bone is found to project from one or both of the angles. This should likewise be removed; and it may be easily done by the pliers or forceps, which ought to be  
both



PLATE LI

FIG

1

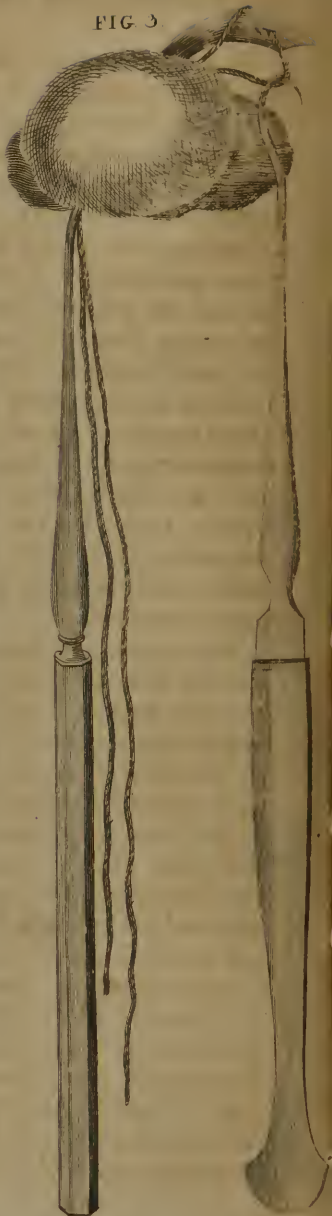


FIG

2



FIG 3



both firm and sharp, as is represented in Plate LVI. fig. 2.

These preparatory steps being adjusted, the surgeon, standing on one side of the patient, must take one side of the lip between the thumb and fore finger of his left hand ; and desiring an assistant to do the same with the opposite side, and to stretch it somewhat tightly, he must, with a common scalpel, make an incision from the under boarder of the lip up to the superior part of it; in which he must take care to include not only all the parts immediately concerned in the fissure, but even a small portion of the contiguous sound skin and parts beneath. And this being done on one side, a similar incision must be made on the opposite side ; which ought to be of the same length with the other, terminating in the same point in the upper part of the lip. By this means, if the operation is rightly done, a piece, including the fissure completely, will be cut out, of the form of the letter V inverted ; and the deficiency will in every part of it have the appearance of a recent wound.

With a view to prevent inflammation, the divided arteries should be allowed to discharge freely, especially if the patient is plethoric ; and this being done, the surgeon is to proceed to unite the sides of the fissure. In this he will be much assisted by desiring the cheeks to be pushed forward so as to bring the edges of the wound nearly into contact, although not altogether so close as to prevent him from seeing freely through from one side of it to the other ; the assistant behind being directed to support the parts in this situation during the remaining steps of the operation.

The surgeon is now to see that the two sides of the cut correspond exactly with each other ; and this being done, the pins intended to support them must be introduced in the manner we have directed in describing the twisted suture, Vol. I. Chap. I. Sect. V. The first pin ought to be near to the under edge of the lip : If possible indeed, it should be placed entirely within  
the

the red part of the lip, leaving no more space beneath than is merely necessary to support it. Another pin must be inserted in the centre of the cut, and a third within a very little of the superior angle of it. By some we are advised to use a greater number of pins; but even in adults three are always sufficient, and in infants two will very commonly answer. In passing them they ought to be made to enter nearly half an inch from the edge of the fore; and being carried nearly to the bottom, which will be seen by retaining the wound open in the manner we have directed, they must be again passed outward in a similar direction and to an equal distance on the opposite side of the fissure.

The assistant should be now desired to push forward the cheeks, so as to bring the edges of the sore close together, when a firm waxed ligature should be applied over the pins in the manner we have formerly directed for the twisted suture, and as will perhaps be better understood by fig. 3. Plate LVII. The surgeon should first apply the ligature to the under pin; and having made three or four turns with it, so as to describe the figure of 8, it should then be carried to the contiguous pin; and being in a similar manner carried round this pin, he is then to finish the operation by carrying it to the other; taking care in applying it round all of them, to draw it of such a tightness as may retain the parts in close contact; but not so strait as to irritate or inflame them, as is sometimes done.

By some authors we are desired to make use of a separate thread for every pin, in order, as they say, to admit of one pin being removed, if it should become necessary, without disturbing the others. This, however, never happens to be the case; so that the precaution is altogether unnecessary.

A piece of lint, covered with mucilage to retain it, should now be put over the course of the cut, with a view to protect it more effectually from the air; and it should likewise be made to cover the ends of the pins to prevent them from being entangled with the bed clothes,



PLATE III.

FIG.

1.

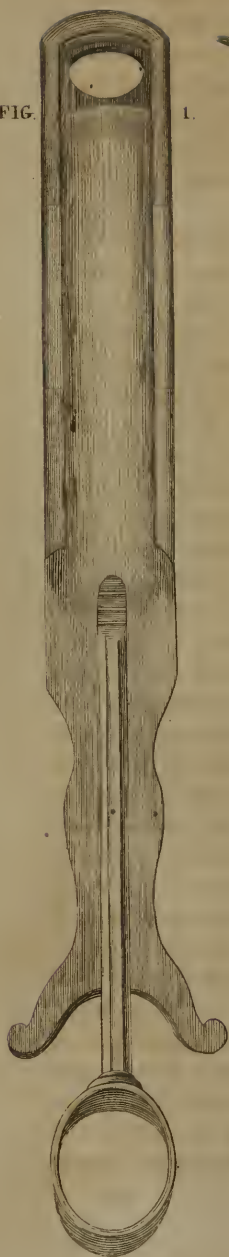


FIG.

2.

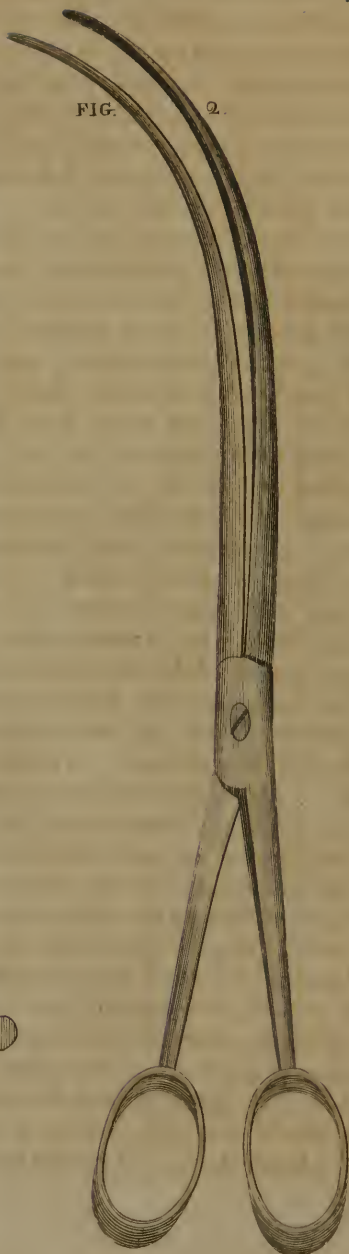


FIG.

3.



clothes, or otherwise ; and this is all the dressing or bandage which in general is necessary. We are desired indeed by many, after the pins are all secured, to apply the uniting bandage, in order to support the muscles of the cheek, so as to prevent the pins from cutting or irritating the parts through which they are passed, which they are apt in some degree to do, when the deficiency of parts produced by the disease is considerable.

This however, is a practice which I have never observed any advantage arise from, and it often does mischief ; for a bandage cannot be applied with such tightness as to give any support to the muscles of the cheek without incommoding the patient exceedingly : and it is apt to do harm, as we have elsewhere observed, by pressing upon the ends of the pins over which it must pass ; for even allowing a slit to be made in that part of the bandage corresponding to the lip, as some have advised, this inconvenience of its pressing upon the pins cannot be altogether prevented : And besides, although a bandage may be applied sufficiently tight at first, the motion of the jaw commonly loosens it soon, so as to prevent it from having any farther effect. When, however, there is a great deficiency of parts, and when the edges of the fore are with difficulty brought together, some advantage may be derived from a proper application of adhesive plasters. An oblong piece of leather, spread either with common glue, or with strong mucilage, such as is employed in making the court plaster, being applied over each cheek, and of a size sufficient for reaching from the angle of the jaw to within an inch or thereby of the pins on each side, and each piece of leather having three firm ligatures fixed to that end of it next the pins, one at each corner and another in the middle, the cheeks should now be supported by an assistant, when the ligatures should be tied so as to retain the parts in this situation ; and if care be taken to make the ligatures pass between the pins, and not immediately over them, no harm or inconvenience will occur from them. It rarely happens, however

ever that any assistance of this kind is needed ; for I have, in almost every instance, found that the pins answer extremely well without any support whatever.

It is scarcely necessary to observe, that during the time the pins are in the lip, the patient should be fed upon spoon meat, and should be prevented from laughing, crying, or from stretching his mouth in any manner of way.

The pins having remained in the lip for five or six days at farthest, they should now be taken out ; for by this time, as I have found by experience, the most perfect union of the parts is produced ; and by remaining longer they are apt to leave marks which do not so readily disappear as when they are taken out sooner. I believe, indeed, that three days would frequently prove sufficient ; but as I know from experience that the pins may without detriment, be allowed to remain in the fore for five or six days, I think it better not to remove them sooner.

This is the practice we wish to advise for a common case of hare lip ; and, as a farther illustration of it, some figures are delineated in Plate LVII. representing the appearance of the disease before the operation—the parts which ought to be removed—the application of the pins—and the appearance which the parts should have when the operation is finished. But for a more particular account of these, we must refer to the explanation of the Plate.

What we have hitherto been saying relates to the disease in its most ordinary form. In the case of a double hare lip, there is a necessity for performing the operation twice in all its parts ; first in one fissure and then in the other. By some we are directed to do them both at once : but this ought by no means to be attempted ; for by doing so we incur much risk of losing all the advantage that may be derived from the intermediate sound parts, and of which I once met with a very disagreeable instance. The sound part of the lip lying between the two fissures was by no means inconsiderable,

considerable, but being much stretched with a great number of pins passed through it, it began to inflame immediately after the operation; and the inflammation and pain increasing, the whole pins were obliged to be removed, and the patient would not afterwards submit to any farther trial. We ought, therefore, first to complete the cure of one fissure; and this being done, we may in the space of two or three weeks venture with much safety on the other.

In describing this operation, we have desired, that although the fissure may not extend the whole breadth of the lip, yet that the cut should pass up to the upper part of it: And any person accustomed to this operation will know, that the parts may be united much more neatly in this manner, than when the lip is only cut through part of its breadth. By the one method of treatment, the parts when drawn together are smooth and equal; but by the other, they are apt to be uneven and much puckered.

We have also desired that the surgeon should take particular care to make the two sides of the cut exactly of an equal length: a point of much importance in this operation, and requires more attention than is commonly paid to it; for it is obvious, if one side of the wound be longer than the other, that the cicatrix will not be smooth and even as it ought to be: by inserting the first pin at the edge of the lip, this part of it will be very properly united, but the rest of it will have a very disagreeable appearance. The most effectual method of guarding against such an occurrence is the marking with small dots of ink, not only the length of the cut on each side, but the direction which it ought to take, by which every chance of going wrong is prevented.

It is of much importance to have the lip equally and tightly stretched in making the incision, otherwise the edges of the fore will be ragged and uneven: This may be always prevented by proper attention; but

with a view to guard against it as much as possible, curved forceps may be employed for laying hold of the lip. They are delineated in Plate LV. fig. 1. They should be made so as to compress the lip equally; and being applied in the direction intended for the incision, the scalpel should be carried along the side of them, by which means the cut may be made very exact and even. Various forms of this instrument have been recommended; but the one we have delineated is of a more simple construction, and answers the purpose equally well, if not better, than any of them.

By some we are desired not to employ any instrument of this kind, on the idea of its irritating and bruising the lip. This suspicion, however, can have occurred only to those who have never used it; for when it is smooth and equal in every part, a degree of compression may be employed with it perfectly sufficient for fixing the lip without creating the least uneasiness to the patient. This I can assert from much experience of its utility.

Instead of making the incision in this manner, some have directed it to be done by fitting a piece of paste-board, lead, or tin, to the gums beneath; and the lip being placed upon it, to cut down with a scalpel upon the supporting substance: The operation may be very properly done in this manner, but the cut is more easily made in the manner we have directed.

Till of late the incision in this operation was commonly made with scissors; and although they are now very generally laid aside on the supposition of their bruising the lip, yet the operation may be very properly done with them. I would not think it right to employ scissors to cut a part of much thickness, but the lip is seldom so thick as to render it improper to use them in cutting for the hare lip. They have of late been used in this place by different practitioners; and as a point of this kind can be determined by experience alone, I have likewise employed them. In

order





order to ascertain which of the two modes of operating, that with the scalpel or with the scissors, ought to be preferred, I in one case made the incision in one side with a scalpel, and in the other with scissors. The patient averred that the scissors gave least pain, probably from their making the cut in somewhat less time than is necessary with the knife; and, during the cure, that side of the lip which was cut with the scissors neither swelled nor inflamed more than the other. I do not from this, however, mean to say, that scissors are preferable to the scalpel; I mention it only to show that the common idea entertained of them is ill founded, and that the operation may be equally well done with both instruments. Scissors for this purpose should be very strong, and particularly firm at the joint. They ought also to be highly polished. The size and form of them represented in Plate LVI. fig. 1. has been frequently used, and is found to answer.

When describing the Twisted Suture in Vol. 1. I gave the preference to gold pins; and I am still of opinion that they are the best. When of a proper form, such as are represented in Plate II. figs. 2. 3. and 4. they pierce the lip with much ease without any assistance from a *porte-aguille*: but they who think that a sharper and firmer point than can be given to gold will answer better, may have steel points added to them as is represented in Plate LVII. and the steel points being moveable, they may be removed after the pins are passed, by which every risk is prevented of their wounding the contiguous parts. By some practitioners, flexible needles are employed for this operation; but they have not been found to answer so well as those which are firm and give sufficient resistance to the ligatures.

In passing the needles, I have said that they should go nearly through to the opposite side of the lip: This ought to be particularly attended to, otherwise a fissure will remain in the inner part of the lip, which may afterwards prove troublesome by the food lodging in it.

And besides, although the discharge of blood which succeeds to this operation is always stopt immediately on the parts being drawn together by the ligatures where the pins have been properly introduced, yet when they are not passed to a sufficient depth, the blood will continue to get out behind, and may afterwards be productive of much distress. I have seen an instance of this where a very troublesome oozing of blood continued for several days after the operation; and an instance is recorded even of death ensuing from it. In order to prevent the lip from being stretched by the patient spitting, it is the usual practice to desire him to swallow his saliva with any blood that may be discharged from the sore. In this case the patient complied implicitly with the directions given to him; and he died from the cause I have mentioned, namely, a great loss of blood. His stomach and bowels were found filled with blood which he had swallowed.\*

There being the least chance of such an occurrence, should be a sufficient reason for patients being prevented from swallowing their spittle after this operation, till it is observed that there is no blood mixed with it; but besides, it sometimes happens, that sickness and vomiting is induced even by a very small quantity of blood passing into the stomach, by which the lip is much more stretched than it would be by all the blood from the wound being spit out.

We have thus described all the steps of the operation for the hare lip: and it is proper to observe, that they are equally applicable in the treatment of a fissure in the lip by whatever cause it may be formed; only, in a recent cut, as the edges of it are already raw, all that the surgeon has to do is to insert the pins and apply the ligatures. In wounds where suppuration has already commenced, there is usually some degree of inflammation upon the edges of them: While this continues

\* Vide Memoires de l'Academie Royale de Chirurgie, Tom. IV. page 427.

continues it would be improper to draw them together by ligatures; but as soon as the inflammation subsides, we may with much propriety insert the pins and finish the operation in the manner we have directed. We are told indeed by many, that this practice will succeed only in recent wounds, and that it ought not to be recommended where matter is already formed: I have often, however, acted otherwise: and I have uniformly found, where the edges of a sore have not become callous, that they have been united as easily when covered with pus as when perfectly recent and covered with blood.

In cases of hare lip attended with a fissure in the bones of the palate, after uniting the soft parts in the manner we have pointed out, some advantage may be derived from a thin plate of gold or silver, exactly fitted to the arch of the palate, and fixed in by a piece of sponge stitched to the convex side of it to be inserted into the fissure. If the sponge be inserted dry, and be properly fitted, the moisture which it imbibes from the contiguous parts will in many instances make it remain sufficiently firm, by which both speech and deglutition will be rendered more easy. In some cases, however, the form of the fissure is such as prevents the sponge from having any effect. This always happens when the opening is wider outwardly than it is found to be more internally. For such cases other means have been proposed, especially thin plates with gold springs, made so as to fix upon the contiguous parts; but no invention of this kind has been yet found to succeed.

## SECTION II.

*Of the Extirpation of CANCEROUS LIPS.*

THE under lip is more frequently attacked with cancer than any other part of the body; and as we know of no internal remedy by which the disease can be cured, the only means we employ for it is the removal of the part affected. In a former publication, we endeavoured to show, that little dependence can be placed either on arsenic or any of the caustic applications, which have been so much recommended for this purpose; and that we are to trust to the scalpel alone for relief.

When a cancerous sore has spread over any considerable part of the lip, and especially when the lip is altogether affected, all that a surgeon can do is to remove the diseased parts; to secure the divided arteries by ligatures, when this is found necessary; and to dress the sore as a recent wound from any other cause. In this manner a cancer may be effectually taken away; but it gives a very disagreeable appearance, the under teeth and gums being left all uncovered; and the patient can neither retain his saliva, nor swallow liquids, but with much difficulty. There is here however, no alternative; for where the whole lip is taken away, the inconveniences we have mentioned must necessarily ensue, as there is no possibility of drawing the divided parts together.

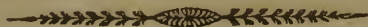
But when the disease has not attacked any considerable part of the lip, we may always have it in our power to draw the edges of the cut together so as to make them unite with the twisted suture in the manner described in the last section: by which we not only prevent a great deformity, but the patient is equally capable as he was before the operation, of swallowing liquids and retaining his saliva: And besides, this method of treatment, as we have elsewhere remarked,

marked, by leaving a very small extent of cicatrix, seems to have some effect in preventing a return of the disease; at least this has been evidently the case with those that have fallen under my observation. Where the operation has been performed in the usual way, without drawing the divided parts together and uniting them by ligatures, the disease has in several instances returned: But, excepting in a very few unfavourable cases, it has never returned where the hare lip method of treatment has been employed. Nay more, this will sometimes succeed where the other has failed. A man appeared at our Infirmary here with a cancer on the under lip. It had been twice removed by extirpation in the usual way; but the disease returned after each operation soon after the healing of the sore. As there was not so much of the lip removed as to prevent the sore from being treated in the manner we have directed, after taking away all the diseased parts, this method was accordingly put in practice. The cure was completed; and I had an opportunity of knowing, eight years after the operation, that the man remained in good health, without any return of his disease. Nor should we be deterred from doing the operation in this manner by the disease being extensive, if we find that the parts which have been divided can be drawn together and retained by the twisted suture: And this, we may remark, may be always done where the disease does not render it necessary to remove almost the whole lip. These parts stretch so considerably, that in general this method of treatment may be adopted, although a third part only of the lip is left after the operation. With respect to the method of doing the operation, we must refer to the last section. In addition to what was then said, we have to observe, that all the cancerous parts ought in the first place to be removed, taking care to form the cut in such a manner as will most readily admit of the edges of it being easily and neatly drawn together. When the disease is seated in the lip only, the parts

will have nearly the same appearance after this operation, as they have after that for the hare lip. But when the disorder extends to the cheek, as is sometimes the case, a longitudinal division of the lip will not only be necessary, but a transverse cut into the cheek ; both to be united by pins and ligatures : an operation which in different instances I have put in practice with very complete success.

## CHAPTER

## CHAPTER XXX.

*Of the DISEASES of the MOUTH.*

## SECTION I.

*Anatomical Remarks.*

**B**EFORE we proceed to consider the diseases which are the object of the present chapter, it will be proper to premise a short anatomical description of the teeth, gums, and jaws, the parts in which these diseases are chiefly seated.

On examining a tooth, we find it divided into three parts ; that part of it which lies above the gums, termed the Body or Corona of the tooth : the roots or fangs, which the gums, in a state of health, cover entirely. And a kind of depression between the body and fangs, just where the gums commonly terminate : This is termed the Neck of the Tooth.

The root, as well as the interior part of the corona, is composed of an osseous kind of matter ; but it appears to differ from bone by our not being able to throw injections into it : for although we are told that this may be done, there is much reason to imagine that the opinion is ill founded, from the best anatomists having failed in it.\*

This osseous part of the teeth being of a soft texture, would soon suffer and wear away by mastication : But nature has amply provided against this inconvenience ; for we find all that part of them which lies exposed

\* Vide the Natural History of the Human Teeth, by John Hunter, 2d edition, p. 36, &c.

posed, by being above the gums, covered by a very firm, hard substance, termed the Enamel, which protects them effectually against every injury of an ordinary nature. This part of a tooth, besides being much harder than bone, differs from it likewise in our not being able to pass the most subtle injection into it; nor can it be tinged by feeding an animal upon madder or any other colouring substance, as is the case with every bone in the body. The enamel is thickest on the upper surface of the teeth, especially in the grinder where it is most needed; and it becomes gradually thinner as it approaches the neck, where it terminates. At this part we find the commencement of the periodontum, which covers all the roots of the teeth, and is intimately connected both with them and with the surrounding sockets.

In the interior part of every tooth we discover a hollow, or cavity, corresponding to the size and figure of the tooth itself. It commences by a very small opening in the extremity of the root or fang, at which the blood vessels and nerves of the tooth enter; and this canal becoming wider as it proceeds forwards, terminates at last in the body of the tooth, where we find the cavity filled with a pulpy kind of substance, probably formed by an expansion of the blood vessels and nerves belonging to it. A tooth with one root or fang has commonly only one hole or opening in it; but some teeth have several fangs, and every fang has a canal passing through it, and is supplied with distinct blood vessels, and probably with separate branches of nerves, although these have never been clearly traced into them.

The teeth are fixed in what is termed the Alveolar Process of each jaw. This consists of a broad thick edge, with which the jaws are furnished, divided into separate cells or openings for the fangs of the different teeth; and the roots of the posterior teeth being larger and more expanded than the others, we find accordingly that this part of the jaw is thicker and broader than

than the fore part of it. In the upper jaw this difference, with respect to thickness, is increased by the antrum Highmorianum, a large sinus or cavity in each maxillary bone immediately above the large molares or grinders of each side. This sinus has no communication with the mouth, but it opens into the nostril between the two ossa spongiosa, by a canal, which in the skeleton is large enough to admit a common quill. The alveolar process of the upper jaw is divided from this cavity by a thin plate of bone, in which the roots of the posterior molares commonly terminate; but in some instances they pass through this plate into the antrum itself.

The lower jaw is in infancy composed of two bones, united at the chin by what is termed the Symphysis of the jaw. These bones however are soon joined so firmly together, as to have the appearance of one continued and connected piece. Besides the alveolar process, the under jaw is on each side furnished with other two processes, with which it is necessary for practitioners to be acquainted. The anterior, which seems to be chiefly intended for the insertion of the temporal muscle, is termed the Coronoid Process. It arises in the form of a ridge from the outside of the jaw opposite to the two posterior molares; and proceeding backward and upward, it terminates in a thin sharp point: And the posterior or condyloid process, which is shorter, thicker, and stronger than the other, terminates in an oblong head or condyle, by which the articulation is formed between this bone and the head.

The coronoid process gives a degree of strength and thickness to the external plate of the alveolar process in this part of the jaw that does not take place in any other part of it. This renders it highly improper to attempt the extraction of the two last molares by turning them outwards. They should always be pulled towards the inside of the mouth. Through all the rest of the jaw, the sockets or alveolar processes are  
weakest

weakest on the outside, although the difference is inconsiderable ; and they are in both sides weaker in the upper than in the under jaw.

The full number of teeth in an adult is thirty two ; and as they are of different forms, and intended for different purposes, they are accordingly distinguished by particular names. The four anterior teeth in each jaw are named Incisores ; the next to these on each side are the Canine ; and the five posterior teeth on each side are termed the Molares or Grinders ; the two first the small molares, and the other three the large grinders.

In childhood there are only twenty or twenty four teeth, which continue till the sixth or seventh year, when they begin to drop, and are succeeded by others which are termed the Adult or Permanent teeth. The first set, or milk teeth, as they are commonly called, as well as some of the others, are formed in the jaw before birth ; but they do not in general appear above the gums till the child is several months old. In some instances, about the fourth or fifth month, but most frequently about the eighth or ninth, two of the incisores appear in the lower jaw. These are commonly succeeded by two in the upper jaw, and the other four fore teeth appear afterwards, at uncertain periods, between this and the tenth or twelfth month. About the sixteenth or seventeenth month, four of the large molares appear ; for in childhood there are no small molares : One of these push out on each side, leaving a space between them and the incisores for the canine teeth ; which being formed farther up in the jaw, seldom appear before the twentieth month : but about this period, or between this and the end of the second year, both they and other four molares have commonly made their appearance.

These are the periods at which the infantine set of teeth usually appear ; but much variety is met with in this point. I have known the canine teeth appear before any of the molares. In one instance they came forward

forward before two of the incisores. In some cases the incisores have been observed in the second and third months, nay even at birth ; whilst in others, I have known the fourteenth or fifteenth month pass over before any have appeared.

These teeth continue firm till the fifth or sixth year. About this period they begin to loosen ; and between the seventh and twelfth year they are commonly all shed and succeeded by others. By this period too, the jaws are somewhat lengthened, so as to admit of other four molares. Between the twelfth and sixteenth years four others appear ; and in general about the twentieth year the four last of the molares appear, usually named the *Dentes Sapiientiæ*.

The two sets of teeth we have described have very different appearances, insomuch that we may in general know, from the appearance of a tooth, whether it belongs to the infantine or permanent set ; and as this is often a point of importance, it ought to meet with particular attention. It is particularly necessary to be acquainted with their appearances in the treatment of those disorders of the teeth which occur about the time of shedding the first set : for it frequently happens that we would have no hesitation in pulling a tooth, were we certain that it belonged to the first set ; while we would rather decline to take it out if it appeared to be one of those which should continue during life. It has happened indeed in a few instances, that a third set of teeth have appeared ; but this is a very rare occurrence, and is only to be considered as a very unusual deviation of nature.

The sockets of the teeth, and a small portion of the teeth themselves, are covered with a red, firm, fleshy kind of substance, termed the Gums. This substance seems to be almost entirely vascular ; for the slightest wound or scratch in it is always attended with a discharge of blood. The alveolar process of each jaw is entirely covered with it ; so that we find a small portion of the gums between every two teeth. In some diseases,

diseases, particularly in the scurvy, a partial separation often occurs of the gums from the teeth ; but in a healthy state they adhere so firmly to the necks of the teeth as to have some effect in fixing them in their sockets.

We shall now proceed to treat of the diseases of these parts, and of the operations performed upon them.

## S E C T I O N    I I .

### *Of* DENTITION.

**D**URING the approach of the first set of teeth, and in some instances of that of the second, much distress is frequently experienced from the irritation produced by the teeth upon the gums. For this reason I have thought it right, before proceeding to the diseases of the mouth, to offer a few general observations on Dentition.

In Dentition the gums inflame and become full about the part where the teeth are afterwards to appear. The child is constantly rubbing the gums with his fingers. The saliva is for the most part increased in quantity ; but in a few instances it is otherwise, and the mouth becomes perfectly dry. The bowels are commonly very irregular, the patient being on some occasions extremely costive, and on others distressed with a diarrhœa. The heat of the body becomes increased, and quickness of pulse takes place along with other symptoms of fever. These are the most frequent symptoms attending dentition ; but it often happens that they are accompanied with subfultus tendinum, and even with convulsions.

As these symptoms originate from irritation, those means are chiefly to be depended on which are most effectual in counteracting this. Hence we derive much advantage from opiates, blisters, and especially from

from warm bathing. But when these fail, which they often do, we have it frequently in our power to remove every symptom, by making an incision through the gums directly upon the approaching tooth or teeth ; an operation usually termed scarifying the gums.

A common prejudice prevails against this operation, from an idea of its doing harm, in the event of a cicatrix being left upon the gums, which sometimes happens when the tooth is not just at hand ; for it is supposed that the cicatrix will afterwards be worse to penetrate than if the gum had not been touched. For this reason the operation is seldom or never done till the tooth is observed to have elevated the gum considerably : but in this we are wrong ; for when delayed so long, almost all the advantages which may be derived from it are lost. I have commonly observed, that the very worst symptoms which occur from dentition, take place before the teeth have come this length ; and that they usually abate on the teeth approaching towards the surface of the gums, probably from the gums being rendered more insensible by the long continued pressure of the teeth beneath.

Whenever we have reason to suspect therefore, from the nature of the symptoms, that they are owing to this cause, we ought without hesitation to make a free incision through that part of the gums where there is most reason to expect a tooth ; and if this incision should afterwards heal, and if the symptoms supervene again, no risk can occur from the operation being repeated. I have frequently found it necessary to cut two or three times upon the same tooth ; but with a view to prevent the necessity of this, I commonly make a crucial incision down to the depth of the tooth, and I have never observed any inconvenience to occur from it. We have no cause whatever to be afraid of hemorrhagy. Indeed the cut seldom bleeds above a few drops, and it commonly heals easily.

The operation may be done with a common lancet, or with a bistoury or scalpel, the instruments usually employed

employed for it : but it cannot be neatly done with any of them ; and besides, we are in danger, either with a lancet or scalpel, of hurting the contiguous parts. The instrument represented in Plate XLIX. fig. 4. is not liable to any of these objections ; and being of a small size, it may be entirely concealed in the palm of the hand. The child being secured by the nurse, the surgeon with the fingers of one hand should open the mouth ; and conducting the edge of the instrument with the fore finger of the other, the incisions should be finished before withdrawing it, by making a crucial cut over every tooth that appears to be approaching. The incision, as we have already advised, should always be carried to the depth of the tooth, so as to lay it entirely bare ; and when this is freely done, the effects which result from it are often remarkable. I have seen instances of children being instantly relieved by this operation who previously appeared to be in the most imminent danger.

It sometimes happens too, as we have already observed, that disagreeable symptoms take place from the approach of the second set of teeth. I have known pain produced over the whole jaw, attended with swelling and inflammation of the gums and cheeks, from a single tooth not getting freely out. This happens most frequently with the *dentes sapientiæ* ; in some instances, from the usual cause of irritation produced upon the gums, which in the back part of the jaws are very thick ; but in others from there not being room in the jaw to admit them. In the first case, we have it commonly in our power to remove all the symptoms, by making a free incision directly upon the tooth ; but in the other this does not always prove sufficient, and nothing will frequently answer but the extraction of the tooth. When it is discovered that the symptoms originate from this cause, we should not hesitate about the removal of the tooth : for it seldom happens that any advantage is gained from delaying it, and the inflammation induced upon the gums often  
spreads

spreads to the throat and other contiguous parts ; and is thus productive of much distress, which might be easily prevented. When the throat inflames and swells from this cause, no other remedy will prove successful ; and it is often surprising how soon the most violent degree of inflammation is removed by it. I have known instances of much distress in the throat relieved immediately by the removal of a tooth, which had obstinately resisted every other means for several weeks.

### SECTION III.

#### *Of the Derangement of the TEETH.*

**T**HE second set of teeth frequently appear in a very irregular manner : Some of them will be very properly placed, while some are farther out upon the jaw, and others farther in, than they ought to be. When the derangement is not very remarkable, it seldom meets with much attention ; but in some instances the deformity produced by it is so considerable as to require the assistance of art for removing it. It occurs most frequently in the incisores and canine teeth, seldom or never in any of the molares.

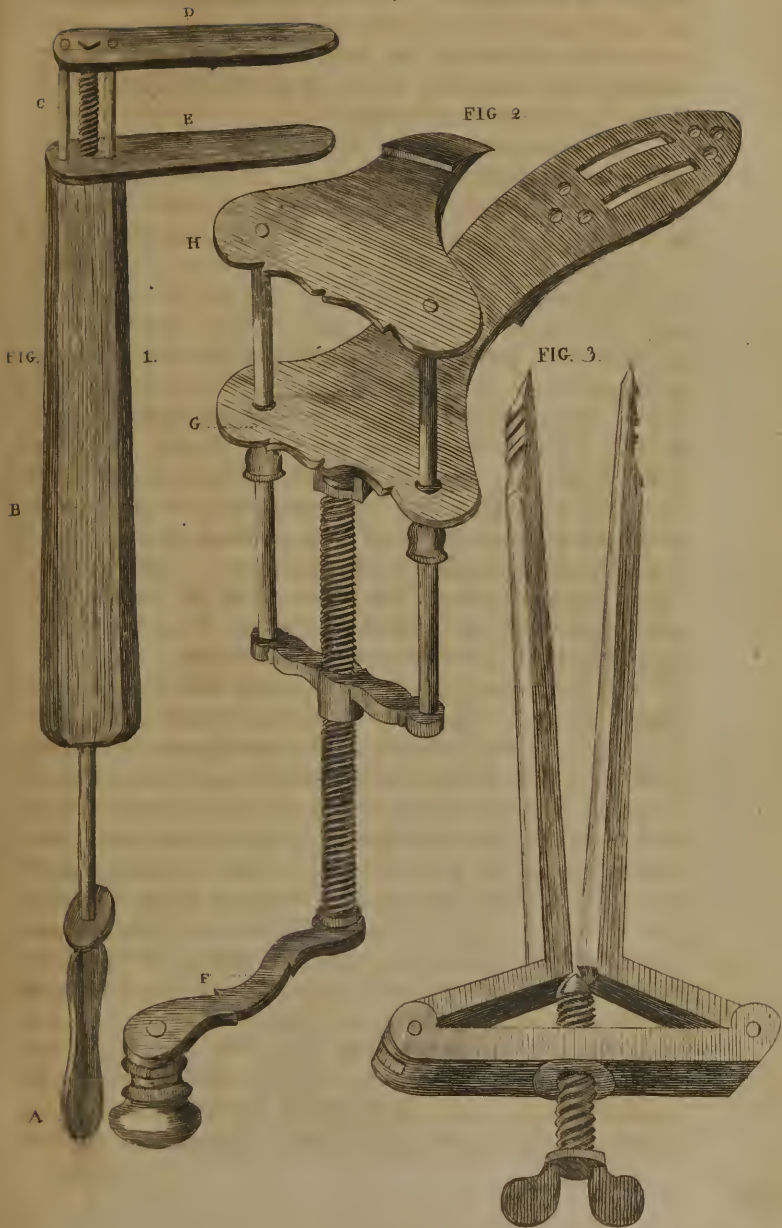
Derangements of the teeth may occur from different causes :—from a deficiency of space in the jaw, by which they cannot be all admitted in one circle ;—from a natural mal-conformation ;—or from some of the first set remaining firm after the second set have appeared.

It will sometimes happen, that the teeth which are out of the circle will fall into it without any force being applied to them, on space being given to them by one or more of those which are in the circle being pulled. When it appears, therefore, that the derangement is owing to any of the first set not having dropped, they ought to be taken out immediately ; for the

longer it is delayed, there will be the less chance of the irregular teeth falling into their situation : but when it is even owing to those of the second set being too large for the space they are to fill, we should not hesitate in removing some of them, for no other method will prove successful. When the teeth which occupy the natural circle of the jaws are regular and have a good appearance, the tooth or teeth which are out of the circle ought to be pulled ; but when either of the contiguous teeth do not fill the place so properly as these would do, or when they are rough or otherwise of a disagreeable appearance, it may sometimes be adviseable to pull one of these that are in the circle, and endeavour to bring the others into the range. If this be done before the teeth have been long fixed, and if they are not far distant, they will sometimes in a gradual manner, as we have said, fall into the vacancy without any assistance ; but when this does not happen soon from an effort of nature alone, we may frequently employ means for promoting it. No attempt, however, of this kind, can be made till the body of the deranged tooth has passed freely out from the gums, as till then it cannot be easily laid hold of.

The usual method of moving teeth which are out of the circle, is by applying a ligature round them, and tying each end of it firmly to the contiguous teeth, and pulling it tighter from time to time : or a plate of gold or silver is fitted to the contiguous teeth, and made to surround the deranged teeth in such a manner, that when it is firmly pressed down by the opposite jaw, it acts with considerable force in bringing the teeth nearer together. This last method, however, proves troublesome to the patient ; and the other, at the same time that it will in some degree move the deranged teeth towards the circle, will nearly in the same proportion draw the others out of it ; but we may in another manner apply a ligature for this purpose with perfect safety, and it is by much the best we have yet seen of moving deranged teeth. Let a thin plate of gold,

PLATE LIV.





gold, of a length sufficient to pass over four of the contiguous teeth, be exactly fitted to the side of those teeth opposite to that which is to be moved. The plate should be perforated with several small holes : On being applied to the teeth, and tied to them by a bit of waxed thread, let a piece of flexible wire be passed through two of the holes ; and the doubling of the ligature being carried over the tooth to be moved, the two ends of it should be firmly drawn through the holes, and should now be fixed with a pair of pliers. Every three or four days the ligature should be made somewhat tighter ; and this being persevered in, almost every tooth in this situation may at last be brought into the circle.

It sometimes happens that a good deal of deformity is produced by an opening in the anterior part of the jaw, formed either by one or more teeth being accidentally driven out, or from there being a natural want of them. When a practitioner is called immediately on a tooth being driven out, he ought by all means to replace it ; or if the tooth be broke, or otherwise much injured, he may consult the inclination of the patient with respect to the transplanting of a sound one from the mouth of another person. But in matters of this kind the patient seldom complains till the parts affected have become inflamed and tumefied, when it is too late to put this method of treatment in practice. In this situation we must wait till the pain and swelling are entirely removed ; when, if more than one tooth is wanting, the deficiency must be supplied with artificial teeth fixed to those which remain firm ; but when one tooth only is wanting, we may frequently, in young people, be able to remove the deformity by passing a ligature round the two contiguous teeth, so as by degrees to draw them nearer together. Nature will frequently effect this, in some degree, of herself : but the operation is commonly slow ; and besides, it is seldom done so completely as when a ligature is employed. By this means the bodies of the teeth are

H2

equally

equally drawn together ; but when the ligature is not used, although the teeth, from want of support, will fall nearly together at their points, the opening will commonly remain nearly the same at their roots.

## S E C T I O N IV.

### *Of GUM BOILS.*

**T**HE gums, like all the soft parts of the body, are liable to abscesses ; but collections of matter occur more frequently in the gums than in other parts, from their being more exposed to causes which tend to produce them. Abscesses may in this situation originate from cold and from external violence, as well as from every cause which tends to produce inflammation in other parts ; but they are for the most part traced as the consequence of tooth ach : and they occur not only from carious teeth, but from inflammation at the roots of teeth, when perhaps in every other respect the teeth may appear to be sound.

A gum boil commonly appears after a fit of tooth ach has continued for some time. It begins with some degree of pain, attended with a small tumor on the part affected. By degrees the cheek swells ; and this swelling frequently spreads over the whole face so as to produce much deformity. On suppuration taking place, the small tumor, which is commonly seated on the outside of the gums exactly opposite to the diseased tooth, begins to point ; and if it be not opened, it generally bursts either through an opening in the side of the gum, or between the gum and the tooth. A quantity of matter is now commonly discharged, by which the patient in general receives effectual relief : But as the cause still remains, the discharge likewise continues ; for as the disease is most frequently induced by some affection of a tooth, or by a portion of the jaw becoming carious, a stillicidium of matter usually continues,

tinues, either till the diseased tooth is removed, or till the carious part of the jaw has exfoliated : Or, if the opening happens to close, the disease will be soon renewed by the swelling returning, and again going through all the stages of inflammation and suppuration in the manner we have already described. When indeed the disease is owing merely to inflammation at the root of a tooth, and when the root happens not to be denuded of its periosteum, after the matter of the abscess is evacuated, the sides of it may collapse and adhere, and a cure will in this manner take place : But when the disease is produced either by a carious tooth, or by a carious portion of the jaw, or even when it proceeds from inflammation alone, if the root be laid bare by the matter, the disease will not be perfectly eradicated till the tooth or carious part of the jaw is removed ; for these will continue to irritate the contiguous parts in the same manner with extraneous bodies of any other kind. In the case of a spoiled tooth, we should advise it to be immediately removed : but when the disease originates merely from inflammation at the root of a tooth, before pulling it every method of a more simple nature ought to be tried ; and the same means which we employ in the treatment of abscesses in other parts should be put in practice here. When a free opening is formed by the bursting of the abscess, we may sometimes be able to dry up the running, by injecting from time to time a little lime water—ardent spirits—tincture of myrrh—or tincture of Peruvian bark properly diluted. But although trials of this kind may be adviseable with timid patients, who will not submit to other means, we can seldom place much dependence upon them : The most effectual practice is to lay the abscess open by an incision from one end to the other, and to endeavour to heal it from the bottom by inserting a small dossil of lint between the edges of it, to keep it open till it is nearly filled beneath with proper granulations. This is the surest method of obliterating the cavity of the

impoſthume ; and when any portion of the ſocket is carious, it will more readily exfoliate than it would do were it ſtill covered with the gums.

We have hitherto been ſuppoſing that the abſceſs is ſeated in the gums, or between the gums and the tooth, or perhaps that it ſurrounds the ſocket of the tooth ; but it often happens that more deeply ſeated abſceſſes occur, which create not only more immediate pain and diſtreſs, but more ſubſequent riſk : for when the more ſolid parts of the jaw become carious, which they commonly do when the matter of impoſthumes gets into contact with them, the cure not only proves tedious, but marks of a diſagreeable nature are apt to occur from it externally. With a view to prevent theſe diſtreſſing occurrences, we ought not to ſolicit the formation of pus by the uſual method of applying warm poultices outwardly ; we ſhould rather, by warm fomentations taken into the mouth, and by the application of any warm ſtimulating ſubſtance, ſuch as a roasted onion, to that part of the gum which appears to be moſt affected, to endeavour to excite a ſuppuration that may point into the mouth ; and as ſoon as there is reaſon to ſuppoſe that matter is formed in the abſceſs, it ought to be opened without waiting for a complete ſeparation.

In the after treatment of the abſceſs, all that we can do is to preſerve a free depending orifice for the diſcharge of any matter that may form, by which any farther miſchief will be prevented, and by which alone we can reaſonably expect a cure ; for even where the diſeaſe is connected with a carious ſtate of the jaw, giving a free vent to the matter is perhaps all that art ought in this ſituation to attempt. If the conſtitution is otherwiſe ſound, this, together with the removal of any of the contiguous teeth that are ſpoiled, and of ſuch parts of the jaw as are carious and ſeparate from the reſt, will ultimately effect a cure if this by any means be practicable. But in diſeaſed habits of body, eſpecially in ſcrophulous conſtitutions, affections of  
this



PLATE LV

FIG.

1.

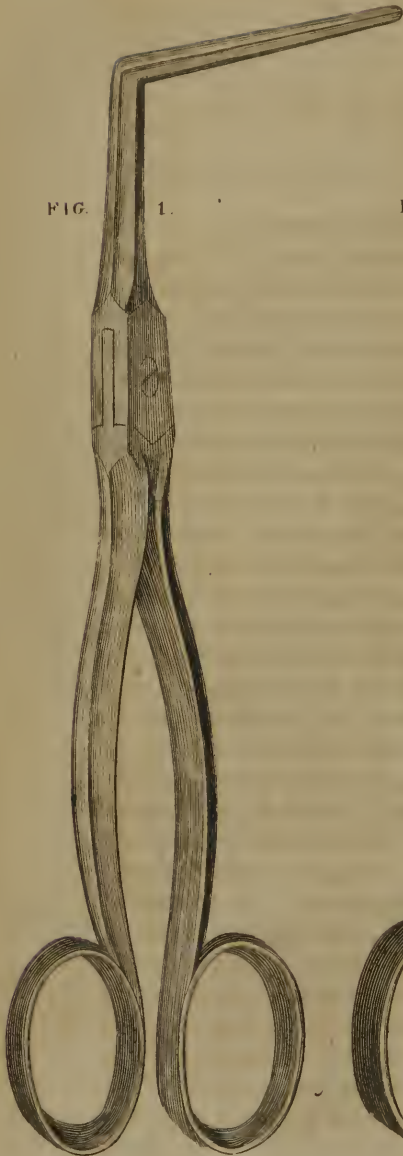


FIG.

2.



this nature are always productive of much distress, and can seldom indeed be healed till the general disease of the system is removed.

## SECTION V.

### *Of Abscesses in the ANTRUM MAXILLARE.*

**C**OLLECTIONS of matter may occur in the antrum maxillare from various causes : Whatever tends to induce inflammation on the lining membrane of this cavity may be productive of them. Hence they may be induced by blows and other injuries done to the cheeks. Inflammatory affections of the membrane of the nose, and even long continued inflammation of the eyes, by spreading to the contiguous membrane of the antrum, have often appeared to have some effect in producing collections of this kind ; and much exposure to cold has frequently been traced as the cause of them. But the most frequent origin of this disease is pain and irritation produced in the jaw by repeated and violent returns of tooth ach.

From this account of the cause of the disorder, the nature of the symptoms will be readily understood. Indeed, if we make allowance for the nature of the parts in which they occur, they will be found to be nearly such as take place from inflammation and abscesses in other parts of the body. At first some degree of pain is felt over the cheek of the affected side, and this frequently continues for a considerable time before any external swelling is perceived. On a farther continuance of the disease this pain becomes more severe, and in some instances spreads to the neighbouring parts, so as to create uneasiness in the eye, nose, and ear ; and at last an extensive hard swelling appears over the whole cheek, which sooner or later points at a particular place, most frequently in the centre of the cheek, a little above the roots of the posterior molares.

In some instances, indeed, the matter bursts out between the roots of these teeth and the gums, by which the external tumor upon the cheek is prevented from pointing. This, however, does not commonly happen; and only takes place, I imagine, when the roots of the teeth penetrate the antrum, by passing through the plate at the bottom of the socket. For the most part, too, as soon as matter is fully formed in the antrum, we find some of it discharged by the corresponding nostril, when the patient lies upon the opposite side with his head low; and if this occurs frequently, it prevents the external swelling for a considerable time from pointing at any particular place, and consequently from bursting, which it always would do if the matter was not evacuated in some other manner.

This discharge of matter by the duct leading from the antrum to the nostril does not indeed occur in every instance; but as I have met with it in several cases, I am not inclined with Mr. Hunter to consider the obliteration of this duct as a frequent cause of these collections.\* Indeed I doubt if it is ever the cause of them. For the most part, they may be traced as the consequence of one or other of the causes we have mentioned; particularly of toothach, or of inflammation excited in some other manner. It therefore appears probable, when obstructions are met with in this duct, that they are rather to be considered as a consequence of the disease: perhaps most frequently as the effect of the adhesive stage of inflammation, than as the cause of the collection.

A discharge of matter from one of the nostrils, when it succeeds to pain and inflammation of the cheek, will for the most part be found to originate from an abscess in the corresponding antrum maxillare; but we ought to remember that matter may be discharged from the nostrils from other causes; particularly from an inflamed state of the membrana Schneideriana;  
from

\* See a Practical Treatise on the Diseases of the Teeth, &c. by John Hunter, F. R. S. &c. p. 44.

from an ozena ; from affections of the frontal sinuses ; and from abscesses in the lachrymal sac. In forming an opinion, therefore, of such an occurrence, every circumstance connected with it should be taken into consideration, otherwise much disappointment and inconvenience may frequently occur by our treating one disease for another.

In the treatment of abscesses of the antrum maxillare, nothing will ever accomplish a cure but a free discharge being given to the matter : Indeed collections of matter in this situation should be considered in the same light with similar affections in whatever part of the body they may occur. Wherever matter is discovered, it ought to be discharged as quickly as with propriety it can be done : and in no instance is it more necessary to attend to this than in abscesses of the antrum maxillare : for if the matter be not evacuated, it will distend and elevate the bones of the cheek, and at last will probably render them carious.

With a view to prevent such a disagreeable occurrence, a perforation should be made into the antrum as soon as there is sufficient evidence, from the nature of the symptoms, to conclude that matter is collected in it. It may be perforated in two different parts. In that part of it which projects outwardly over the two great molares ; or one of these teeth may be taken out, and an opening made into the antrum, by perforating directly upwards in the course of one of the fangs. As most people wish to avoid the pulling of a tooth when it does not appear to be absolutely necessary, the perforation is commonly made in cases of this kind above the roots of the teeth. This lenity, however, proves often hurtful ; for in this manner the perforation must be made in the side of the antrum, by which a depending opening cannot be given to the matter ; nor can this be effectually obtained in any other way but by a perforation made in the manner we have mentioned in the direction of one of the roots of the teeth.

We have already observed, that either of the two large molares may be drawn in order to admit of this perforation. When either of them is spoiled, the diseased tooth ought to be taken out ; for, being carious, there will be some reason to suspect that it may have some share in the formation of the disease : but when this does not happen, we should remove the second great molaris, or that tooth which lies next to the dens sapientiae ; for although the tooth immediately anterior to this is somewhat more accessible, the difference in this respect is inconsiderable ; and the plate of bone which separates the antrum from the roots of the teeth being thinner in the back part of the jaw than in the anterior part of it, the perforation is accordingly more easily made in it.

On removing one of these teeth, it sometimes happens that the matter is immediately discharged with freedom from the antrum ; owing either to the roots of the teeth having been naturally so long as to penetrate this cavity ; or, to the matter having corroded the bone which separates them from it. In this case, if the opening is sufficient for evacuating the matter, the operation will thus be completed : but as it is easily enlarged, it ought always to be done where there is any cause to doubt that the matter will not be discharged with freedom. But when no discharge of matter occurs on pulling the tooth, an opening must be made into the antrum in the manner we have already advised, by pushing a sharp instrument into it in the direction of one of the fangs. A common trocar is usually employed for this, and in general the operation may be well enough done with it ; but the curved instrument represented in Plate L. fig. 2. answers better. In making the perforation, the patient should be seated on the floor opposite to a clear light, and his head should be laid back upon the knee of the operator, who may either be standing or sitting behind him. The instrument should be withdrawn as soon as it has entered the antrum, which will be easily known by

by the resistance being removed from the point of it. The matter will now flow out freely ; and as soon as it is all evacuated, a small wooden plug exactly the size of the trocar should be introduced into the opening, with a view to prevent not only the air, but the food during mastication, from finding access to the antrum ; and if the plug be properly fitted to the opening, it will remain sufficiently firm, while at the same time there will be no risk of its slipping in, if it be formed with a knob or head somewhat larger than the rest of it.

This plug should be removed from time to time, perhaps twice or thrice in the course of a day ; by which all the matter will be quickly evacuated ; and no more being allowed to collect, the disposition to form it will in general be soon removed, and a cure will thus be obtained. But in some instances, either from much relaxation of the lining membrane of the antrum, or from some other cause of a similar nature, the discharge of matter does not diminish, but continues nearly the same both in quantity and consistence long after the operation. In this case we may often forward the cure by throwing liquids of a moderate degree of astringency from time to time into the antrum. A decoction of bark is commonly employed for this purpose : but nothing should be used that contains the least particle of solid matter, as there is always some risk, when any thing of this kind is injected, of depositions being left in the antrum ; and in different instances I have seen mischief occur from this. I commonly employ a solution of alum, brandy properly diluted, or lime water.

When the contiguous bones are all sound, a due continuation of this practice will at last accomplish a cure ; but when any of them are carious, it will be in vain to expect a cure till the diseased portion either exfoliates, or till it dissolves and comes away in the matter. The introduction of a probe will always render us certain whether any part of the bones in the  
antrum

antrum be carious or not ; but we may in general rest satisfied with respect to this point, from the smell and appearance of the discharge. When the bones are carious, the matter is always thin and fetid, and it becomes thicker and less offensive as this affection of the bone diminishes.

We have hitherto been supposing that the antrum is perforated for the purpose of discharging matter collected in it ; but the same operation becomes necessary for the removal of other causes. I once met with an instance of a violent blow on the cheek terminating in a collection of blood in this cavity ; and worms forming in it can only be removed by this operation. In what manner worms are produced in this situation is difficult to determine ; but whenever their presence is indicated by severe pains in the region of the antrum, not induced by toothach or any other obvious cause, there can be no risk in making an opening for extracting them ; but in this case there will be no necessity for removing any of the teeth. A perforation made into the antrum, immediately above the roots of the large molares, will answer the purpose sufficiently. We should not however rest satisfied merely with extracting such worms as appear at the opening : We ought to inject from time to time such liquids into the antrum as will most probably destroy any that may remain ; particularly oil, a filtrated solution of asafœtida, and perhaps a weak infusion of tobacco : and the perforation should be kept open for a considerable time, to prevent as much as possible the risk of any worms being left.

I have mentioned the only two parts in which I think the antrum can with propriety be opened ; namely, in the direction of the roots of the two large molares of the upper jaw ; and immediately above the roots of these teeth on the outside of the jaw. I think it right, however, to observe, that it has been said, that a perforation may be also made into the antrum from the nostril. There is no doubt of this being practicable ;

ble ; but we might with perhaps equal propriety say, that an opening may be made into it by entering the instrument from the roof of the mouth. It is evident, however, that it would not be so proper to perforate the antrum in either of these parts as in those we have mentioned ; and therefore I would not have thought it necessary to take notice of them, were it not with a view to give my opinion of this method of making an opening from the nostril ; which being proposed by very respectable authority, I think it right that the younger part of the profession, for whom this is chiefly intended, should know that there is much cause to doubt of the propriety of it.\*

By pursuing the means we have recommended, almost every disorder arising from collections of any kind in the antrum maxillare may be completely carried off : But the antrum is liable to swellings of a different kind, of a much more dangerous nature, and which frequently do not terminate but in the death of the patient. They seem to originate from an enlargement of the bones of the cheek. No matter is found in the antrum ; and therefore no advantage is derived from any perforation that is made into it. I have in different instances, indeed, observed much mischief ensue from it : for those who are not much accustomed to this branch of practice, are apt to be misled by the appearance of these swellings ; and, suspecting that they contain matter, they very commonly make perforations into them, which frequently aggravates all the symptoms, by occasioning a more rapid increase of the disease. We ought therefore to be attentive in endeavouring to distinguish swellings of this kind from real collections of matter in the antrum. In abscesses of this cavity the cheek seldom swells to any great extent ; and when the disease has been of long duration, if the matter does not find an opening into the nostril, or along the roots of the teeth, it commonly points towards

\* V. The Natural History of the Human Teeth, Part II. page 46, first edition, by John Hunter, F. R. S. &c.

towards the most prominent part of the cheek. But when no matter is collected, and when the disease proceeds from some affection of the bones, the swelling by degrees arrives at a considerable size, but it spreads equally over the whole cheek, without pointing at any particular part, excepting in the very latest stages of it, when the surrounding soft parts becoming affected, suppuration sometimes occurs in them. Till the skin becomes inflamed, which never happens except where the disease has been of long continuance, the swelling remains quite colourless. But the most characteristic mark of it is a remarkable degree of elasticity which it acquires. The bones yield to pressure; but they instantly return to their situation on the finger being removed; and if in this state an incision be made into them, which I have known done, they are found to be reduced to a soft cartilaginous state, and in the advanced stages of the disease to a consistence somewhat gelatinous.

This kind of swelling is of a nature so very obstinate, that hitherto I have scarcely known any advantage result from any remedy that has been employed in it. In a few cases where carious teeth have appeared to have some effect in producing it, the removal of them has put a temporary stop to the progress of the disease: but even this has never produced any permanent advantage; I mean in the real diseased state of the bones we are now considering: for the cheek is, like other parts of the body, liable to swellings of a more harmless nature, which yield to the remedies commonly employed for them. But in this no benefit occurs either from internal medicines or external applications. Long continued gentle courses of mercury, along with decoction of mezereon, I have sometimes thought have proved useful; but the good effects resulting from them have never been of long duration.

FIG

1.

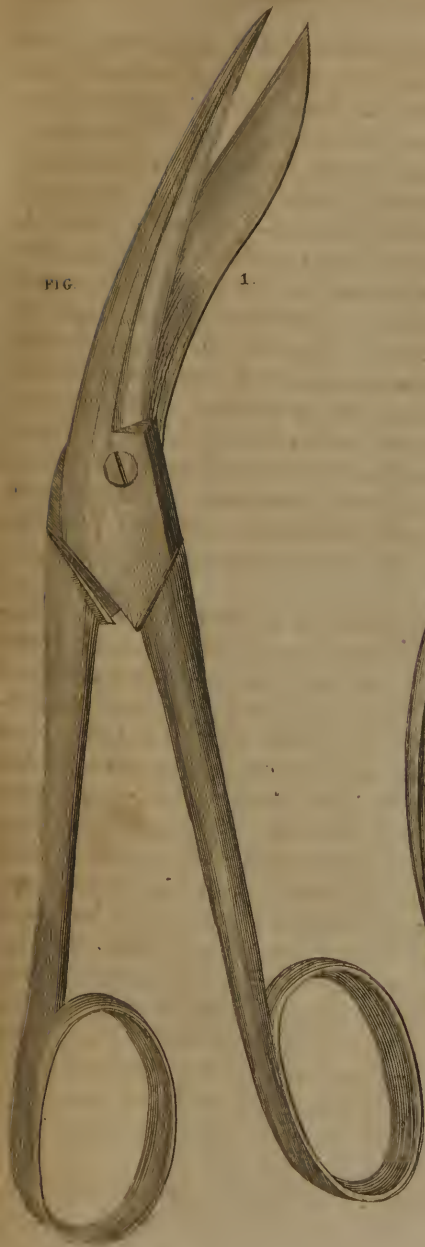
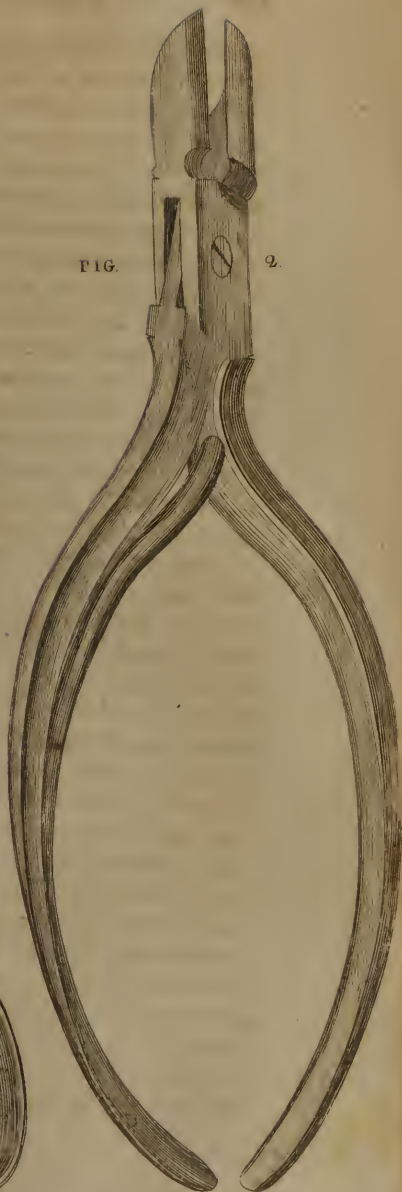


FIG.

2.





## SECTION VI.

*Of EXCRESCENCES on the GUMS.*

THE gums are liable to excrescences of different degrees of firmness. They are all of a red colour, nearly the same with the gums themselves; but some of them are soft and fungous, while others are firm, and even of a hard warty nature. In some cases they are attended with pain, but for the most part they create no farther inconvenience than an impediment in speech and mastication. They are met with in both jaws, but most frequently in the under jaw and in the inside of the teeth. In some instances they are connected to the gums by a small neck, but in general they adhere firmly through their whole extent.

Excrescences of this kind frequently originate from carious teeth, and in a few instances from a carious state of the alveoli; in which case the removal of the spoiled teeth, and the subsequent exfoliation of the carious part of the jaw, will often accomplish a cure. Like fungous excrescences in other parts of the body depending on a carious bone beneath, as soon as the diseased part of the bone is removed the excrescence usually begins to shrivel, and at last commonly disappears altogether: but when this does not happen, the tumor should be removed as soon as it proves in any degree troublesome; and this should be the more readily proposed, as the operation is attended with very little risk. With those not accustomed to this branch of practice, an aversion indeed prevails against meddling with tumors of this kind, either from an idea which almost universally takes place of their being of a cancerous nature, that will probably be rendered worse by an operation; or from a fear of the hemorrhagy that will succeed to the extirpation proving troublesome. We know from experience, however, that there is in general no cause to be afraid of either of these circumstances.

stances. I have extirpated several tumors of this kind ; and I never knew an instance of a cancer succeeding to it, or of any hemorrhagy of much importance.

When the excrescence is attached to the gums by a narrow neck, it should be removed by passing a ligature round it of a sufficient tightness for making it drop off ; but when it is connected to the contiguous parts by a broad base, we are under the necessity of taking it away with the scalpel. The actual and potential cauterly used to be employed for this purpose ; but as this practice is now laid aside, and will not readily be revived again, we do not think it necessary to describe it.

In proceeding to the extirpation of the tumor, the patient should be firmly seated opposite to a clear light, and the head should be supported by an assistant standing behind. If he is possessed of sufficient resolution, there will be no need of instruments for keeping the mouth open ; but where this cannot be with certainty depended on, which is commonly the case with children, a speculum oris becomes absolutely necessary. There are various forms of this instrument. The one in common use is represented in Plate LIV. fig. 3 ; but it occupies too great a space in the mouth to admit of a free application of other instruments. To obviate this, I some time ago proposed the one delineated in the same plate, fig. 1 ; and it has by experience been found to answer.

A common scalpel will for the most part answer for dissecting off the tumor ; but an operator ought always to be provided with others, particularly with a curved knife, such as is represented in Plate XXXVIII. fig. 1. and likewise with crooked scissors, such as are delineated in Plate XLIX. fig. 1 and 2 ; for in some instances the roots of these excrescences are more easily separated with instruments of this kind than with those of a straight form. But whatever instrument may be employed, much advantage may be derived from

from elevating the tumor as much as possible from the parts beneath with a dissecting hook ; and for 'this purpose a hook should be used with two fangs, such as is represented in Plate L. fig. 3. which answers much better than the single hook in common use. In the course of the operation, care should be taken to remove the diseased parts entirely, at the same time that the incision should not be carried so deep as to injure the parts beneath, unless the tumor be firmly and closely attached to them ; in which case, it may not only be proper to remove a portion of the gums, but even to go to the depth of the socket : But as this will be attended with some risk of injuring the contiguous teeth by laying their roots bare, it ought never to be advised when with any propriety it can be avoided.

After the operation a moderate degree of hemorrhagy is advisable, and ought to be encouraged with a view to prevent the sore from inflaming : But when it proceeds too far, it should be restrained, by the patient taking from time to time a mouthful of spirit of wine or of tincture of myrrh ; or if this does not prove sufficient, the application of lunar caustic will seldom or never fail.

The situation of the sore renders the application of dressings inadmissible : For some days, however, after the operation, the mouth should be frequently washed with a warm emollient decoction ; and afterwards, if a cicatrix should not form so readily as might be expected, the cure may be promoted by the application of lime water, Port wine, tincture of roses, or any other mild astringent.

## S E C T I O N VII.

### *Of LOOSE TEETH.*

THE teeth ought naturally to continue firm till they become loose by the ordinary effects of old age : but they are liable to some affections which ren-

der them loose, and which even make them drop out at very early periods of life ; and as this is often productive of much distress and deformity, it becomes frequently an important object with practitioners.

As the teeth may become loose from various causes, all of which require a different method of treatment, we shall enumerate the most material of them, and at the same time shall point out those means of cure which seem to be best adapted for each of them.

The teeth are frequently loosened by external violence : By falls and blows—and often by an improper use of instruments in pulling the contiguous teeth when carious or otherwise diseased.

Teeth loosened in this manner can be made fast only by being kept for some time as firm as possible in their situation ; which may be done by pressing them as far into the socket as they will go, and fixing them with ligatures of Indian weed, cat gut, or waxed silk, to the contiguous teeth, and feeding the patient upon spoon meat till they become firm.

In young people, when teeth are loosened by external violence, as the sockets at this age are complete, they readily become firm again when they are kept a due time in their situation by ligatures : nay, even when they are forced entirely out of the sockets, they will soon become firm, if they be immediately replaced and retained in their situation. I have in several instances put this method of treatment successfully in practice, and no harm can result from the trial. But in old age, when the teeth become loose, from whatever cause this may happen, the chance of their being again firmly fixed is very small ; so that in very advanced periods of life the practice ought never perhaps to be attempted.

The teeth sometimes become loose from thick layers of tartar forming upon them, and passing in between the gums and the roots, and in some cases even between the sockets and the roots : In this case the removal of the cause, if it has not subsisted too long, will  
commonly

commonly be attended with a removal of the effect. The tartar should be completely scaled off: but it ought to be done as soon as possible; for the longer the teeth remain loose, the less chance there will be of their ever again becoming firm.

We frequently find the teeth become loose, from the gums becoming soft and spongy, and separating not only at their necks, but often a considerable way down from the roots. This sometimes occurs from a long continued course of mercury; but it is commonly, although often improperly, attributed to the scurvy. It no doubt occurs as a symptom in the real sea scurvy: but this is a very uncommon disease at land; while the other, viz. a soft spongy state of the gums, is frequently met with.

When, however, it originates from a general scorbutic affection of the system, nothing but a removal of this will accomplish a cure; but when it is a local disorder merely, topical remedies are alone to be depended on. When teeth have remained long loose, we cannot with any certainty say that any means we may employ will render them firm; but the most effectual remedy hitherto employed, is, scarifying the gums both in the outside and inside of the affected teeth. The incisions should be carried deeply into the substance of the gums: They should be allowed to discharge freely, and should even be repeated from time to time as long as any of the teeth remain loose. By this means the full spongy state of the gums we have described is often removed, and a disposition produced in them to adhere to the investing membrane of the teeth, by which they often become perfectly firm.

With a view to remove this sponginess of the gums, astringents are frequently prescribed; but I never knew any advantage result from them: On the contrary, a frequent use of them seems to do harm, by inducing a disposition in the gums, which deprives them forever of the power of adhering to the parts beneath: at least, I have met with different instances where this

appeared evidently to be the case ; in which, by a long continued use of remedies of this kind, the gums became so hard and firm, that the scarifications which were afterwards employed had no effect in fixing them. They should not therefore be used till an adhesion is produced between the gums and the teeth, either by means of scarifications, or in some other manner ; and when this is accomplished, they may be employed with freedom, and even with advantage. The remedies of this kind that are most to be depended on, are, tinctures of Peruvian bark, of oak bark, tincture of myrrh, and a strong solution of alum. The mouth should be frequently washed with cold water, strongly impregnated with any of these, at the same time that the patient should be directed not to use those teeth that have been loose till they have for some time been perfectly firm.

The teeth are sometimes loosened by the formation of abscesses between their roots and the alveoli ; especially when the alveoli, from being thus immersed in matter, at last become carious : But having already treated minutely of this point when speaking of gum boils, in the fourth section of this chapter, we must now refer to what was then said upon it.

It is scarcely necessary to mention the loosening of the teeth which occurs in old age : for this takes place from a cause for which there is no remedy. Not from the roots of the teeth decaying, or from their being pushed out of their sockets ; but from a real annihilation of the sockets ; probably in consequence of the osseous matter of which they are composed being absorbed, while nature having now no use for teeth, does not continue to supply it.

## SECTION

# PLATE LVII

FIG 1



FIG. 2.

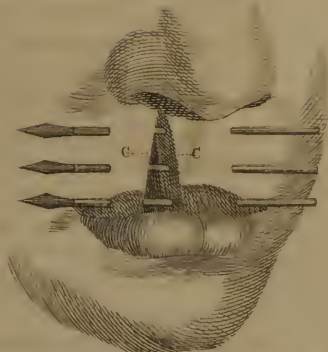


FIG. 3.

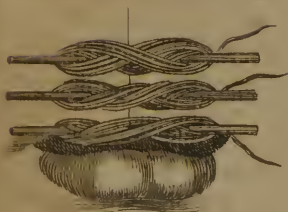


FIG. 4

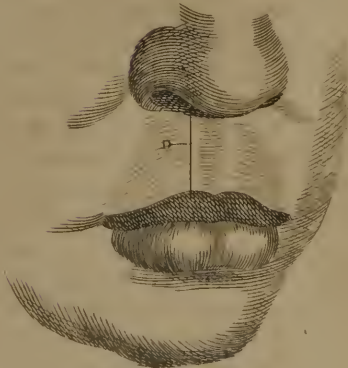


FIG. 5.



FIG. 6.



FIG 7





## SECTION VIII.

*Of CLEANING the TEETH.*

THE teeth are apt to become foul from different causes, and frequently require the assistance of a dentist to render them clean.

1. They sometimes lose their natural healthy colour, and acquire a dusky yellow hue : Or they become to a certain degree black, without any adventitious matter being perceptible on any part of them.

2. On other occasions they become foul, and give a disagreeable putrid taint to the breath, merely from a too long remora of the natural mucus of the mouth.

3. But the most frequent cause of foul teeth, is a calcareous matter forming upon them commonly termed the Tartar of the Teeth, which seems to be a deposition from the saliva, as calculi in the bladder are from the urine. There are few people entirely exempted from this ; but some are much more liable to it than others, insomuch that I have known different instances, of the teeth becoming thick incrustated with it, in the course of a few weeks after they have been completely freed from it.

The tartar first appears in the fore teeth, and in those parts of them that are least liable to be rubbed upon by the tongue or by the lips. Hence it is first perceived on the outside, in the angles between two of the teeth near to the junction of the gums. The ordinary effects of mastication prevents it in general from spreading towards the points of the teeth : but the disposition to form it is in some constitutions so remarkable, that I have known it proceed from the gums upwards even over the flat surfaces of the grinders ; and in such instances, if it be not removed, it is apt to spread over the whole teeth so as to give the appearance of a continued incrustation from one end of the jaw to the other. In some cases again, instead of pass-

ing over the whole, it seems to fix more particularly on one or two teeth ; and in such instances the deposition of this matter goes on so quickly as to give cause to suspect that the whole calcareous matter of the mouth is by some cause or other attracted to this particular point. I have known one or two teeth completely covered with it in the space of a few weeks, while the rest of the mouth has remained entirely free of it. In some cases these partial incrustations become so large as to disfigure the cheek outwardly ; and, by those not accustomed to this branch of practice, they are sometimes mistaken for diseases of a more formidable nature. They have even been treated as exostoses of the jaw bone.

While the tartar consists of a thin scale only, and as long as it is confined to the external surface of the teeth, and does not prove hurtful to the gums, it seldom meets with much attention : but when it forms in any considerable quantity, it very commonly hurts the gums by producing slight ulcerations upon those parts to which it lies contiguous ; or, it insinuates itself between the gums and the alveoli, so as to separate them to a considerable depth from one another. In either of these events, those means should be employed by which we know that it will be most effectually removed.

When the teeth have remained long covered with extraneous matter of any kind, if it has acquired any degree of firmness, it is scarcely possible to remove it without the assistance of instruments. Even a slight discolouring, although it may not be attended with any perceptible covering of an adventitious matter, if it is of long continuance, it can seldom be removed in any other manner. But when once the teeth are thoroughly cleaned with scaling instruments, they may in general be preserved in this state with a very ordinary degree of attention. Frequent washing with cold water ; and rubbing them every second or third morning with burnt bread ; Peruvian bark ; cream of tar,  
tar ;

tar ; chalk ; or any other mild application in fine powder, will for the most part keep them perfectly clean and white : but this we must observe is not universally the case ; for the tendency we have mentioned to a foulness of the teeth, especially to a deposition of tartar, is in some instances so great, that the greatest pains and attention will not prevent the renewal of it. This, however, is not a common occurrence ; for we all know, that a due attention to cleanliness will very generally prevent every formation of this kind.

We have said, that when once the teeth have become very foul, they cannot be cleaned without the assistance of instruments. This is at least the best, as it is the safest method. It is necessary however to observe, that the application of acids of a certain strength will in general render the teeth perfectly clean, and even white ; for the tartar and other matter that adheres to them being soluble in acids, a frequent use of them will remove it completely ; and we accordingly find, that acids of one kind or other form the basis of almost every wash that has been advertised for the teeth. The public, however, ought to be much on their guard against every application of this kind ; for the teeth themselves are very apt to be hurt by acids, inasmuch that it is perhaps impossible to employ any remedy of this nature of a sufficient strength for dissolving any extraneous matter upon them, that will not at the same time prove injurious to the enamel. Every one knows that even the mildest vegetable acid will render the teeth rough, or set them on edge : We may therefore very readily suppose, that those of a stronger nature, the mineral acids, which are very commonly used for this purpose, must prove much more hurtful ; and in fact many have lost their teeth entirely by the use of applications of this kind.

It is indeed said by many, that instruments have done much harm, by hurting the enamel of the teeth, at the same time that they remove the incrustation with which they are covered. This I believe has happen-

ed in some instances : but it ought not to be considered as the fault of the remedy, but of the manner of applying it. A sharp instrument may no doubt be so improperly used as to remove the enamel entirely ; but this must always be the fault of the operator : for every incrustation to which the teeth are liable may be taken off with safety, and without doing any injury whatever to any part of the teeth.

In Plate LVIII. instruments of various forms are represented for this operation. Figs. 2. 3. and 4. are the best, and will answer for most purposes ; but the others are sometimes necessary for the removal of such parts of the incrustation as form between the teeth. They should all be moderately sharp, otherwise the operation will be done with difficulty : but the edge of none of them ought to be fine, otherwise it will be apt to turn, and even to break, with the force necessary for scaling off the tartar.

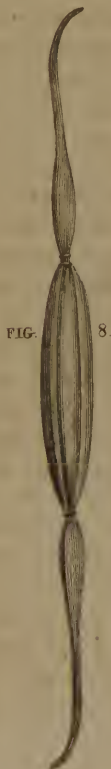
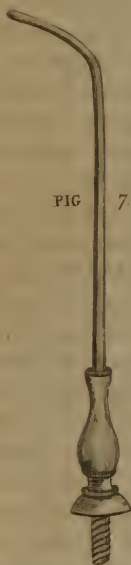
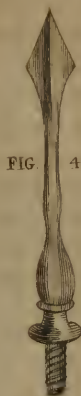
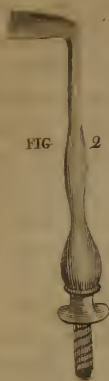
In performing this operation, the patient should be placed upon a low seat, with his face opposite to a clear light, and his head supported by an assistant. The surgeon himself should be seated upon a chair somewhat higher. It is commonly indeed done while the operator is standing ; but we have elsewhere had occasion to remark, that practitioners ought to sit at every operation when it can be done with propriety.

The surgeon should now wrap the fore finger of his left hand in a wet cloth, with which he is to press with some firmness upon the point of the tooth intended to be first cleaned, while the back part of the scaling instrument will form a point of resistance for the thumb of the same hand. In this manner the tooth may be firmly supported so as to prevent every risk of its being moved or loosened by the instrument. This in every case is a necessary precaution ; but it is particularly so when the teeth are in any degree loose.

The sharp edge of the instrument is now to be insinuated beneath the under part of the incrustation, care being at the same time taken to avoid the neck of the

the

PLATE LVIII.





the tooth, otherwise, if it be pushed down this length, and if much force be employed, there will be much risk of loosening, or even of turning out, the tooth entirely. On being certain that the instrument is properly placed, it must be pushed with some firmness from below upwards to the top of the tooth, and must be repeatedly applied in the same direction as long as any of the incrustation remains either on the outside or inside of the tooth : And one tooth being completely cleaned, all the rest which require it must be treated in the same manner. This being done, the teeth should all be well rubbed over with a bit of sponge in the form of a brush, covered with a fine powder prepared of equal parts of cream of tartar and Peruvian bark ; and this being continued from time to time, it will seldom happen that any farther assistance will be necessary : but if, notwithstanding of this, the teeth are again observed to turn foul, any incrustation that may form upon them must be scaled off in the manner we have mentioned.

This is the safest and most effectual method of cleaning the teeth when they become foul from any kind of extraneous matter forming upon them ; but they sometimes loose their colour, as we have already observed, and acquire a kind of foulness, when no matter of this kind is perceptible. Even in such cases, as long as the surface of the teeth remains smooth and sound, moderate friction with the edge of a scaling instrument will frequently prove serviceable : and if the operation be done with caution, no risk whatever will accrue from it. But when the teeth become black from a cause of this nature, we sometimes find the enamel corroded, or perforated as it were with an infinite number of small holes ; and this, we must observe, is the worst kind of foulness to which they are liable : for it is difficult to remove, and when removed, it in general soon returns, and seldom stops till all the teeth which have been attacked with it are destroyed.

As

As this kind of foulness cannot be removed with instruments, we are under the necessity of employing some chemical preparation for dissolving it. All the mineral acids will do this in the most effectual manner ; but, for the reasons we have already given, they ought never to be used. I have commonly employed saponaceous, or even pure alkaline applications ; by which the teeth may be often rendered perfectly clean without any injury being done to the enamel. A strong lather of common soap will often answer ; and a solution of salt of tartar applied over the teeth with a small pencil or brush, will on some occasions prove equally successful.

When in this manner the foulness is removed, frequent washing with cold water, and rubbing from time to time with one of the powders above mentioned, are the most effectual means for preventing a return of it. I have sometimes thought too, that repeated applications of tincture of Peruvian bark have proved serviceable in preventing it. Indeed, as this variety of the affection seems to depend upon some cause of a putrescent nature ; for it is evidently attended with a caries or mortification of the affected teeth ; there is reason to suppose that antiseptics of every kind may prove useful in the treatment of it.

For the purpose of applying powders and other applications to the teeth, brushes of different forms, and various kinds of roots properly prepared, are daily used. Lucerne and alkanet roots dried and beat at one end in the form of a brush, are much employed for this purpose, and they may be used both with safety and advantage for cleaning the interstices between the teeth : but neither these nor any kind of brush should be employed for rubbing the roots of the teeth and the upper parts of the gum ; for as their points pass in between the gums and the sockets, they are apt to separate the one from the other, from which much mischief is apt to ensue. For this reason, I always employ a  
piece

piece of sponge fixed in a small handle, with which the roots of the teeth may be rubbed with safety.

## SECTION IX.

### *Of TOOTH ACH.*

**T**OOTH ach appears to be more unsupportable than any other kind of pain. It renders those who are affected with it very unhappy ; and as it is one of the most frequent diseases to which the human body is liable, it requires much attention from practitioners. The pain induced by tooth ach, even when it is confined to a single tooth, is often productive of great distress ; but this is trifling when compared with the consequences which sometimes ensue from it. Indeed many instances have occurred of the strongest constitutions being ruined by frequent returns of it. Besides the usual symptoms of pain in one or more of the teeth, and of swelling in the contiguous gums ; the cheek frequently becomes tumefied ; the eye, and even the ear of the affected side, are often attacked with pain and inflammation ; and to these, fever, with all its consequences, is apt to succeed.

These symptoms may be induced by different causes, and by affections of the teeth seemingly of opposite natures.

1. They may originate from the nerve and other parts within the cavity of a tooth being denuded, either by external violence, or by the enamel falling off in consequence of becoming carious or otherwise diseased.

2. They may proceed from inflammation, either of the parts within the affected tooth, or of the membrane which surrounds the root of it. And,

3. The teeth and contiguous parts of the jaws are often attacked with very violent pain in consequence of what is usually termed Sympathy ; that is, they of-

ten

ten become pained from affections of distant parts, very severe fits of tooth ach being sometimes induced by diseases of the eye, of the ear, and of the stomach. We shall proceed to treat separately of these causes in the order they are here mentioned.

§ 1. *Of Tooth Ach from the Nerve being laid bare, and of the various Methods of Extracting Teeth.*

In whatever manner the cavity of a tooth be exposed, we find from daily observation, that for the most it is productive of much pain; and the reason is obvious. Nature, as we have already observed, has provided the teeth with nerves, but at the same time she has given them a very complete covering of bone: When this protection, therefore, is destroyed, either by accident or disease, it must necessarily follow, that these parts which were not formed for being exposed, will suffer various injuries, not merely from the food and drink finding access to them, but from the external air being at all times freely applied to them.

But it is not the mere exposure of a nerve, or the violence employed in laying it bare, which produces pain; it is the consequence of this exposure, the effects which result from it, to which all the distress which ensues ought to be attributed: Of this every practitioner must have met with frequent instances. Thus I have often known the cavity of a tooth laid entirely open by a tooth being broke by a fall or a blow, and no inconvenience ensue from it but a temporary pain somewhat proportioned to the nature of the accident; and it frequently happens that teeth begin to spoil and at last moulder away without any pain or uneasiness. It is therefore evident, that exposure of the nerve alone is not to be considered as the ultimate cause of tooth ach. It is a certain degree of irritability induced by this exposure which appears to be the cause of it; and to this our views ought to be directed in the treatment of it.

This

This irritable state of the nerve may be induced by various causes, and more especially by saccharine, acid, and other stimulating substances contained in food, being frequently applied to it;—by a too frequent use of tooth picks, which may often be traced as the origin of a fit of the tooth ach;—and by much exposure to a stream of cold air. Exposure to cold, particularly in a damp state of the air, often terminates in tooth ach by inducing inflammation; but it frequently produces very violent degrees of pain in a tooth already deprived of part of its enamel, when no other symptom of inflammation can be discovered.

These are the most common causes of tooth ach when the nerve of a tooth has previously been laid bare; and in such circumstances their mode of operating may be easily accounted for; but we cannot so easily explain or suggest a reason for this state of a tooth being such a frequent occurrence, nor does it appear in what manner it is for the most part produced. The enamel is sometimes broke by falls and blows, and it frequently suffers by attempts to break nuts and other hard substances with the teeth: In such cases the cause is obvious; for we know by daily observation, that the osseous part of a tooth very soon becomes carious and wastes away on the enamel being destroyed. But how do we account for the most frequent of all causes of tooth ach, the decay or wasting of the enamel by rottenness, when no evident external violence has been applied to it? It has been alleged that we may often trace it to a too free use of acids, which are generally known to prove hurtful to the enamel; and by some it is said that it depends most frequently upon a want of cleanliness in not washing or otherwise clearing the mouth of putrescent particles after meals. Particles of this kind by resting upon the teeth are supposed to be capable of communicating some degree of their own nature to the enamel; and the affection being once produced in a single point, the contiguous parts will become diseased, we are told, from the same  
cause

cause that mortification spreads in other parts of the body.

We will readily admit that a frequent application of acids to the teeth, even those of the mildest nature, will prove hurtful to the enamel; and therefore they should be avoided; while it is equally clear, that the mouth should be regularly washed after meals, not only for preventing that kind of incrustation upon the teeth which we have already considered, but for preserving a sweetness of breath: It does not however appear probable, that the disease of which we are now treating, spoiled or carious teeth, depends upon either of these causes. Were it to originate from a too free use of acids, it ought to affect all the teeth, or at least a considerable part of them, at the same time and in an equal degree; whereas it begins almost in every instance in a very small point or spot, which in general extends much more slowly than it probably would do if the disease proceeded from any cause of this nature. And again, with respect to the effect of any putrescent particles lodged upon the teeth, we do not think it probable that this disease can be ever induced by them. A piece of meat remaining in the mouth from one meal to another, may acquire some degree of fetor; but it cannot probably in that short period become so highly putrid as to destroy the living principle in those parts with which it comes into contact. It is a point, however, which may be easily determined by experiment; and from the result of some trials which I made for this purpose, there is reason to suppose that the common opinion with respect to it is ill founded. A tooth newly pulled was put into the centre of a piece of putrid beef, and after remaining in it for eight days, it was as free from putrefaction as when first put into it, neither the enamel nor internal parts of the tooth being in any degree affected; and the experiment being repeated with teeth which had been pulled for a considerable time, the result was exactly similar. Now, if this happens with teeth entirely dead,

even

even when totally immersed in highly putrid matter, we may fairly conclude, that a partial application of putrescent particles to teeth still enjoying life and connected with the rest of the body, will not probably have much effect : for we know, that in other parts of the body the vital principle has a considerable effect in resisting putrefaction ; and there is no reason to doubt of the teeth being endowed with the same power of self preservation. But, besides this general argument in support of our opinion, we may remark, that if the common idea on this point was well founded, those parts of the teeth should be most liable to corruption where particles of food are most apt to lodge ; while, on the contrary, those parts of them which are not exposed to this, should seldom or never suffer. Now every practitioner knows that this is by no means the case ; for it must be acknowledged, that one part of a tooth is just as apt to become carious as another. The most likely part for food to rest in is between two teeth ; and we allow that the teeth sometimes spoil in these parts, but by no means more frequently than in other parts not so much exposed to this inconvenience.

It does not appear, therefore, that the causes usually supposed to be most productive of carious teeth have much effect, nor do we know of any incidental occurrence to which in particular this affection can be attributed : From all the observation I have been able to make upon it, I think we ought rather to consider it as depending for the most part upon some general constitutional cause ; upon some tendency in the system to produce a wasting or decay of this particular part. The cause of ~~this~~ again I shall not pretend to explain ; but I think it perhaps equally probable that this rotting of the teeth we are now considering, depends upon some general affection of the system, as that pain in the gout originates from some general cause. Instances no doubt occur, of teeth becoming carious evidently from some particular occasional cause, and especially

especially from external violence breaking or cracking the enamel. This, however is not a common occurrence : indeed it is very rarely met with when compared with the frequency of carious teeth ; a disease which in most instances begins without any evident cause, and which in general has subsisted for some time before being noticed.

But allowing that the opinion we have offered upon this point were admitted, it may be asked, To what purpose will it tend ? Will it suggest any difference in the treatment of the disorder ? I think it will. As the pain of the tooth ach creates much impatience, and is with difficulty submitted to, if the affected tooth is carious, it is in general not only the desire of the patient, but the earnest advice of practitioners, to have it extracted, as being the most certain means of obtaining relief. In violent degrees of tooth ach, when the other remedies usually employed are found to fail, extraction of the diseased tooth ought certainly to be advised ; and in such circumstances no person can be more clearly of this opinion than I am ; but I am equally clear, that, in common practice, this is carried too far, and that many teeth are pulled daily which ought not to be touched. In most instances, the pain will be removed immediately on the diseased tooth being extracted : but it very commonly happens that relief thus obtained is only temporary, and that the caries soon fixes upon some other tooth, which in a short time becomes as much diseased as the first ; and this being likewise removed, the disorder often proceeds from one to another, till scarcely any are left. I have met with various instances of this, where almost the whole teeth have been success<sup>fully</sup> taken out, one becoming carious soon after the removal of another. Nor is there even at last any advantage gained by the practice ; for, after all the teeth are taken out, the pain in many cases remains equally severe in the jaw itself.

The frequent occurrence of cases of this kind tends much to establish the opinion of carious teeth being  
often

often a constitutional disease ; and it likewise suggests the propriety of less frequent extraction than what in common practice is found to prevail. As we can never at first be certain whether the disorder depends upon a general cause of this nature or not, it is perhaps right in every case to extract the first, and even the second tooth that becomes affected, as soon as the violence of pain renders it necessary : but whenever the disposition is so strongly fixed in the habit that a third or a fourth are soon observed to be diseased, the patient should be always advised rather to submit to a good deal of distress than to extract any more : and it often happens, when he has resolution to submit to one fit of the tooth ach, and to wait till it is completely over, that he never afterwards, in this tooth at least, feels any return of it. Cases no doubt occur in which this does not succeed ; but it answers often enough to warrant the propriety of giving it a fair trial in perhaps every instance : Even where it fails, there is no harm done by the trial ; and when it is found to succeed, the advantage gained by it is great indeed. For a considerable time, I adopted the common practice on this point in its full extent : Every carious tooth attended with pain I advised to be pulled ; but finding in general that no advantage was derived from it, the result being for the most part nearly as I have already described, I was hence induced to attempt a different method ; and now, after a patient has had two or three teeth extracted, if the disease still continues to return, I never advise the practice to be pushed farther, unless when the pain is so very severe as to render it absolutely necessary, which is not however often the case. By avoiding exposure to cold during the fit, and by exhibiting doses of laudanum proportioned to the degree of pain, the distress produced by it is at last in general removed ; and by due attention to cleanliness, particularly by frequently washing the mouth with cold water, and, when practicable, by stuffing the opening in the carious tooth, so as to prevent the air from finding access

to it, many have been saved, not only from the pain and distress of pulling these teeth which became first affected, but of losing others, which in all probability would have become carious if the common practice had been followed of extracting every diseased tooth as soon as it becomes in any degree painful.

Having thus endeavoured to show that carious or spoiled teeth are most frequently produced by some general constitutional cause, we shall now proceed to consider more particularly the means to be employed, not only for preventing, but for removing tooth ach depending upon this cause.

In cases of carious teeth, it has been a prevailing practice to advise the black or mortified spot to be removed with a file, with a view to prevent the disease from spreading; but, so far as my observation goes, it ought not to be adopted; for the diseased part of a tooth can never be removed without exposing those parts which remain to a more free access of air than they were previously liable to; and therefore, instead of proving useful, I have almost universally seen it do harm. In many instances, I have known it induce pain where there was none before; and instead of preserving a tooth, it frequently seems to have the effect of rendering the remaining sound parts sooner carious than they would probably have become if they had not been touched. I am therefore clear, that this practice of filing should be laid altogether aside; and whoever considers the necessary effect of it, will probably be of the same opinion. It is evident that the part of a tooth already carious cannot be sensible of pain. For what purpose, therefore, should we remove it? While it remains, it serves in some degree to cover and protect the sound parts beneath, while by taking it off they are left perfectly bare, and apt to be hurt by whatever is taken into the mouth.

When, again, as much of the enamel is removed, either by caries or external violence, as to form a hollow of any magnitude, we have it frequently in our  
power

power to prevent an accession of tooth ach, by stuffing or stopping up the opening, so as to prevent the air and particles of food from getting access to the nerve. Different substances are made use of for this purpose: such as gum lac, mastich, olibanum, bees wax, and sealing wax, tin, lead, and gold. When the opening made by the disease is large, and especially when it is narrow at the bottom, and wider outwardly, mastich and gum lac, or even a bit of bees wax, will sometimes answer when none of the harder substances will remain in the cavity: but as they are quickly rubbed down in mastication, they require to be frequently renewed; so that some of the metals are preferable when the form of the opening admits of their being employed, which is always the case when the tooth is much scooped out inwardly, with a small hole leading into it. Gold leaf is sometimes used for this purpose; but nothing answers so well as common tin foil. As much of it should be cut off as it is imagined will be needed; and one end of it being pushed into the hollow of the tooth with the instruments, fig. 6. 7. or 8. Plate LVIII. the rest of it should be gradually pressed in till the cavity is completely filled: and this being done, any portion of the tin that may be left should be cut off, when the surface of the whole should be made perfectly smooth by frequent rubbing with the burnisher, fig. 9. of the same plate. But before any attempt is made for stopping a tooth, the nerve should be rendered as insensible as possible; for till this is accomplished, the patient will not be able to bear that degree of pressure which fixing the tin requires. In general the nerve becomes sufficiently callous for admitting of this, merely by the delay of a few weeks from its being first laid bare: but when this does not prove effectual, we may often accomplish our intention by inserting daily into the cavity of the tooth a few drops of oil of origanum or of thyme, or any other essential oil; by which any slight degree of irritability in the nerve may be of-

ten removed, so as to admit of pressure being applied to it with freedom.

We have already observed, that neither tin, lead, nor any hard substance, will remain in the hollow of a tooth, unless the opening into it be somewhat contracted. It has been proposed, however, when the opening is of a different form, and when the stuffing cannot be fixed in any other manner, to do it by drilling a small hole through the sides of the tooth ; so that when the lead is pressed into it, it may be retained by passing a peg of silver, gold, or any other metal, from one side of the tooth to the other. In a few cases this may succeed ; but it will not answer either where the opening is very wide outwardly, or where the sides of the tooth are not tolerably firm ; for where the external opening is very wide, even a peg passed through the centre of the stuffing will not keep it sufficiently firm to prevent some parts of the food from finding access beneath it ; and, when the remaining part of the tooth is become thin and brittle, it will be apt to break by the means employed for making the hole.

When, however, by any of the means we have mentioned, the hollow of a tooth can be properly stopped, it will not only prove the most effectual method of preventing frequent returns of tooth ach, but will have some influence in preserving the remaining part of the tooth. I have known various instances of this where spoiled teeth have been preserved for a great number of years, without being productive either of pain or any other inconvenience ; but this requires the cavity to be very completely stopped, so as to prevent every possibility of access either to food or drink, or even to air.

When a patient with spoiled teeth has been liable to frequent fits of tooth ach, besides stuffing them in the manner we have mentioned, he should be as attentive as possible to avoid much exposure to cold : His head should be kept warm by proper coverings through the night ;

right ; and he should live in a dry situation. Indeed, a moist atmosphere proves so destructive to the teeth, that people who live in wet situations find it very difficult to preserve them ; and I have known various instances of frequent returns of tooth ach being prevented entirely, by the patient's removing from a damp to a dry situation : Nay this will sometimes succeed when every other means have failed.

By due attention to the means we have mentioned, much may be done in preventing people with carious teeth from suffering so much as they otherwise would do : but notwithstanding all our endeavours, teeth in this situation are very apt to become painful, and are often productive of much misery ; so that the most effectual method of removing it becomes a very important object.

There are some varieties of tooth ach which we know from experience may be removed by remedies applied to distant parts of the body. Thus when pain occurs in a tooth, as it sometimes does, from inflammation which first began in the ear, it may be more effectually removed by applying a blister behind the ear than by any other means : Or when a foulness of the stomach is the cause of it, a vomit will prove the most effectual remedy. This we shall afterwards consider in a more particular manner. But when tooth ach proceeds from the nerve of a tooth being laid bare, it will seldom happen that any application will prove useful that is not made directly to the part itself. Bark, electricity, and a variety of nostrums, are frequently employed ; but in this variety of tooth ach, the only remedies I have ever known any advantage derived from, are, anodynes, corrosive applications, and extraction of the tooth.

In slight degrees of tooth ach, the pain is sometimes relieved, or even altogether removed, by applying either opium or laudanum directly to the bare nerve : I have known camphor to prove useful, both by itself and when conjoined with opium ; and it sometimes

answers in a liquid form, when dissolved in spirit of wine, when it will not succeed in any other way : Either may likewise be mentioned as a remedy which in this kind of tooth ach sometimes affords relief ; but as these and other applications of a milder nature do not commonly succeed, we are for the most part obliged to employ others of a more active kind, with a view to destroy the nerve entirely.

A long continued use of any of the strong essential oils will in some cases, as we have already observed, render the nerve callous or somewhat insensible, but they will never destroy it so effectually as to prevent the risk of future returns of tooth ach. This, however, may be done by remedies of a different kind ; by the application of spirit of vitriol or any other concentrated mineral acid ; by inserting a bit of lunar caustic into the cavity of the tooth ; or by burning the nerve with the actual cautery. But in using either the lunar caustic or any of the strong acids, much attention is necessary to prevent the contiguous parts from being hurt ; for if they be not inserted with much caution, they are apt to spread and to do a great deal of mischief. The actual cautery may, however, be employed without any risk of this kind : but in order to derive any real advantage from it, the hot iron must be pushed farther into the hollow of the tooth than patients in general will allow ; for if the nerve be not destroyed to the very extremity of the root, no advantage will be gained ; and this being both tedious and painful, we do not find many that will admit of it ; but when a proper application of it is agreed to, we may destroy the nerve completely. It may be done with a piece of small wire made sharp at the point, or the instrument represented in Plate LVIII. fig. 8. may be employed for it.

It often happens, however, that none of these remedies prove effectual, either from patients not submitting to a due application of them, or from practitioners not pushing them so far as they ought to do. In this case,

case, when the pain continues violent, we are under the necessity of destroying the nerve in a different manner, namely, by the extraction of the tooth; and this being done, if the tooth be not much spoiled, and if it be not broke in the operation, after the socket is properly cleared of blood, it may be replaced in the manner we shall afterwards mention when treating of the method of transplanting teeth. This will not always succeed, especially in the molares; but in the back part of the mouth it is not so necessary as when the incisores or canine teeth are taken out, when it will often answer: and when a tooth thus replaced becomes firm, it will prove equally useful as before; while, from the total destruction of the nerve, it will not afterwards be apt to produce pain. We shall now proceed to consider the method of extracting teeth.

As the pulling of teeth is a very frequent operation, much pains has been taken to render it as easy as possible; and although it is still necessarily attended with pain, yet it is now performed both with more ease and safety than it could possibly be in former times, while the instruments employed for it were rude and unmanageable.

It is evident that a tooth may be pulled in different directions: It may either be pulled in a perpendicular direction with respect to its roots; or it may be made to turn upon its axis by depressing the corona or upper part of it, by which the point of the root will be proportionally raised; or a sufficient degree of force may be applied for pushing it out of the socket in a lateral direction.

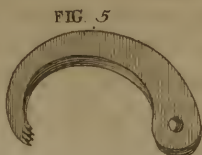
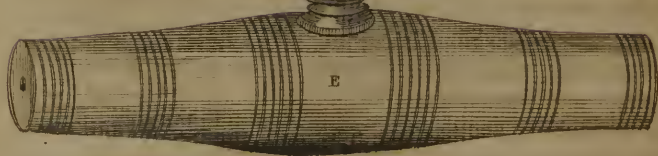
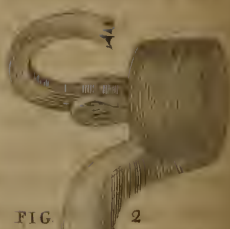
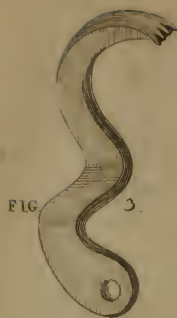
If these methods of operating were all equally practicable, we would not hesitate in determining to which the preference should be given. In raising a tooth perpendicularly, it is clear that much less violence must be done to the contiguous parts than by forcing it out in a lateral direction: for as the roots of the teeth are all firmly fixed in bone, they cannot possibly be pressed out laterally, but with such a force as is sufficient

for breaking or bursting open that part of the alveolar process of the jaw bone with which they are surrounded ; and as this is in general attended with some laceration, and always with much contusion, of the contiguous soft parts, it is necessarily productive of a good deal of pain : but as all the space we can obtain, even by the greatest wideness of the mouth, will not admit proper instruments for moving the teeth in the back part of the mouth in a perpendicular direction, we are for the most part under the necessity of using such as move them laterally. All the incisores and canine teeth may indeed be taken out in this manner, and even some of the molares, when they are very loose ; but when the molares are firmly fixed, no instruments with which we are acquainted will pull them in this direction. Various proposals have been made for this purpose ; but although hitherto every attempt of this kind has failed, some farther trials may perhaps render our instruments sufficiently perfect for effecting it.

The only instruments which practitioners in former times were possessed of for the extraction of teeth, were different kinds of forceps or tenets, named according to their forms, hawks bills, cranes bills, &c. and different kinds of levers both straight and crooked. These, however, were rudely constructed, and it was with much difficulty that teeth firmly fixed were moved by them. In process of time, therefore, various improvements were proposed on them ; but few of these being of much importance, we do not think it necessary either to describe them, or to give delineations of them ; and this especially as they may be seen in the works of Garengéot, Scultetus, Hildanus, and other writers of the last and preceding centuries. All that we mean to do, is to delineate those instruments which are approved of by modern practitioners of reputation ; to propose such improvements upon these as by experience have been found to prove useful ; and to give a detail of the method of using them.

For





For a considerable time past, an instrument, termed a key, has been almost the only one employed in Britain for extracting firm teeth, and it is now very generally used in different parts of the Continent. It is delineated in Plate LIX fig. 1. and 2.

In operating with this instrument, if the tooth to be taken out is in the lower jaw, the patient should be seated in a chair, opposite to a clear light, while his head should be supported by an assistant standing behind ; but if it be in the upper jaw, he should be seated upon a pillow, with his head turned back, and supported upon the knees of the operator, who in this case must stand behind him, whether the tooth be in the right or left side of the jaw : but when a tooth is to be extracted from the lower jaw, if it be on the right side, the operator should be placed somewhat to the left ; and, vice versa, when the tooth is on the left side, the surgeon should place himself somewhat to the opposite side. With a view to admit of as free an application of the instrument as possible, as well as to prevent the gums from being lacerated, all the soft parts adhering to the teeth should be slowly and cautiously separated from it by insinuating between them the point of the scarificator, fig. 1. Plate L. and this being done, the operator must proceed to the application and use of the key. The patient having cleared his mouth of blood, the point of the claw *C*, Plate LIX. fig. 1. must be pressed as far down between the gum and the tooth as possible ; and in this situation it must be firmly fixed and retained by the fore finger of the left hand, while the falcum *D*, being placed as far down as it will go upon the gums on the opposite side of the tooth, the operator must now with his right hand apply such a force as he may find necessary for moving it ; and by turning the hand sufficiently round, almost any tooth may be taken out at one pull without raising the instrument : but whenever a tooth is found to be very firmly fixed, and especially if it be one of the large molares, whose roots diverge considerably, it is better,

better, after it is freely loosened, to remove the instrument ; and having turned the claw to the opposite side, to apply it so as to turn the tooth to the other side of the jaw, by which it will be rendered so completely loose as to be easily taken out with the common teeth forceps, Plate LXI. fig. 3.

In using the key instrument, when the tooth to be taken out is firmly fixed, and especially when there is little or no vacant space between it and the contiguous teeth, some attention is necessary to prevent these from being loosened. When it cannot be prevented in any other manner, the edges of the tooth to be removed should be filed down with a very thin file, which may be done without hurting the neighbouring teeth, by using an instrument that is quite smooth or polished on one side.

This I believe to be the best method hitherto known of extracting firm teeth from the back part of either of the jaws ; and the incisores and canine teeth may likewise be pulled in the same manner : but these, namely, all the fore teeth, as well as loose teeth in every part of the jaw, may be pulled in a different manner, which we shall afterwards describe.

Although there is some difference, as we have already observed, between the outer and inner plates of the alveoli of the teeth with respect to strength ; yet this is so inconsiderable, that in pulling a tooth it merits little consideration. Neither is it a matter of much importance to attend to the direction of the roots in the molares : For although it be alleged by some, that these teeth may be turned with most ease towards the inside of the mouth, from their roots spreading in general towards the outside of the jaw ; yet this is by no means the case. For the most part, the roots of the large molares diverge equally towards both sides of the jaw ; so that in this respect they may be pulled with the same propriety to the one side as to the other. But the two last molares of the lower jaw afford an exception to this ; for they are so situated, that in every  
instance

instance where the common key is employed, they should be turned inwards. The basis or origin of the coronoid process forms a strong sharp ridge on the outside of the jaw, exactly opposite to the roots of these teeth; so that when they are turned outwards, as the heel of the instrument must rest upon this ridge, the gums which cover it are necessarily much bruised and lacerated. As this is seldom attended to, I have seen various instances of much mischief being done by it. When a tooth is much spoiled on one side, it is almost the universal practice in pulling it, to fix the point of the claw on the sound side; and as this is considered as necessary, it may be given as a reason for our being obliged in some instances to turn even one of these teeth towards the outside of the jaw. It is not, however, by any means necessary that this should be universally adopted: for although in general it is supposed to answer best to fix the claw of the instrument on the soundest side of a tooth, and to turn it to the opposite side; yet with a very little pains and attention we might, perhaps, in every instance follow the very reverse of this with equal success: for with a proper application of the scarificator we may almost always separate the gums so effectually as to be able to press the point of the claw far enough down upon the root, so as to turn it with ease to the opposite side.

The key instrument, however, may be made so as to turn even the two farthest back molares outward, without doing any injury to the gums lying above the process we have just mentioned. A form of it for this purpose is delineated in Plate LIX. fig. 3. which I proposed several years ago, and which I have often used. By the heel of the instrument resting upon the gums beneath the first great molares, while the claw is bent in such a manner as to apply to the two posterior teeth, they may in this manner be turned out with safety. The heel should be made long, so as to pass far down upon the gum; otherwise, for this particular purpose, it will not answer so well. Indeed the  
heel

heel of the key instrument should be always longer than it is usually made ; for when it is short, it acts with much less power, and is more apt to break the tooth, than when it is made of a greater length. The contrary of this I know has been much inculcated ; but after having given a fair trial to both methods, I am now convinced that the key with a long heel is much preferable to the other. The principal objection that has been raised to the use of a long heel is, that it must bruise the gum more than when a short one is used. This, however, is not the case, as will be readily allowed by any who attentively considers the subject : For even the shortest heel must press upon some part of the gum ; otherwise, if it be applied upon the tooth itself directly opposite to the point of the claw, as some have advised, it will act in nearly the same manner, and with no farther power than the common forceps : While again, a long heel does not, as is commonly imagined, injure the gums in proportion to the length of it : for although the flat side of it be applied to the gum at first, as soon as it begins to act the farthest extremity of it only will be found to touch them ; and accordingly this part of the heel, as well as all the rest of it, should be made as smooth as possible ; so that in turning upon the gum, it will do less mischief than when it is made rough according to the usual form.

We have already observed, that in the pulling of teeth there is no cause for being attentive to which side they are turned, from any difference of strength between the outer and inner plates of the alveoli or sockets ; for in this respect they are nearly similar. But even although the difference was greater than we find it to be, it should not be regarded : for in pulling a tooth in the manner we have described, namely, in an oblique or lateral direction, it is evident that the socket must be broke on both sides of it ; at least this must be always the case where the roots of the tooth are of the usual length, and not shortened, as they sometimes are, by disease ; for while the corona of the tooth is forced

forced down upon one side of the socket, the point of the root must necessarily be turned in nearly the same proportion upon the other. The softer parts will not indeed suffer so much, as they will not be bruised by the heel of the instrument; but it is clear that the socket must be always much hurt by it; so that in every point of view, little or no consideration is due in this operation to any difference that is supposed to take place in the strength of the two plates of which the sockets of the teeth are formed.

But as it is of much importance to save both sides of the alveoli as far as is possible, nothing should be omitted that can with any propriety be done to protect them. For this purpose a form of the key instrument has been proposed, by which it is intended to support the gums and alveoli: while at the same time the tooth is raised and separated from them, by turning the instrument in the usual manner. But if the socket be so effectually supported as to prevent it from yielding on the tooth being pressed towards it, there is much reason to fear that the tooth itself will break; and if the instrument be not applied in such a manner as to have this effect, it will answer no other purpose than the key in common use; while being more complex, it is managed with more difficulty. The proposal, however, is ingenious, and may lead to improvement in the operation of tooth-drawing.\*

In pulling a tooth with the key instrument it is the common practice to force it out at once. But although this may often succeed, it is by no means advisable: for when the roots diverge much, or when any portion of the fang is enlarged, as is sometimes the case, we run a great risk, by this method, of breaking them, at the same time that the socket must be much more broke than when the tooth is loosened in the manner we have directed, by turning it first to one side and then to the other with the key instrument, so as to be able afterwards

\* This instrument is the invention of Dr. John Aitkin. For a more particular account of it, see *Essays on several important subjects in Surgery.*

afterwards to take it out with the common forceps. And if this be done slowly, with a gradual equal pressure, and if the heel of the key has been properly covered with several plies of soft old linen, scarcely any mischief of importance can be done by it: But instead of this, when the hard instrument is applied directly to the gum, without the intervention of any soft substance, and when the tooth is turned out, as is frequently done, by a sudden jerk, the gums will not only be greatly bruised and lacerated, but the socket will be much more broke, at the same time that the tooth itself will run a much greater risk of being broke than when pulled in a more gradual manner. It is natural for patients who are ignorant of the risk attending it, to wish for the operation to be quickly done; but it is unpardonable in practitioners to indulge them in this, when a moment's reflection must convince them, that it can seldom be done but with much risk of breaking either the jaw or the tooth.

Even when the operation is done in the most cautious manner, troublesome accidents will sometimes occur from it: And these particularly are, bruising of the gum; splinters of bone being separated from the jaw; and alarming hemorrhagies.

Laceration or even bruising of the gum being a very painful part of the operation, it should be prevented as far as possible, not merely by covering the heel of the instrument in the manner we have advised, but by avoiding the application of it altogether, when it can possibly be done, while the gums are much inflamed: for while the inflammation continues, the operation proves necessarily much more hurtful than it otherwise would do. For obviating the effects of laceration, when any small portion of gum is much separated from the rest, it should be cut off with a pair of scissors; the mouth should be fomented from time to time with warm milk or any emollient decoction; and when there is reason to imagine that suppuration will take place, it should be encouraged by the application  
of

of roasted figs by way of cataplasm. In this manner, if an abscess occurs, it will be soon brought to maturation; when, if it does not soon burst, it should be opened: And again, in cases of slighter contusions, nothing alleviates the pain induced by them so effectually as the applications we have mentioned.

When the bone happens to be splintered, if it is the socket merely that has suffered, very little uneasiness will probably ensue from it; and therefore it is scarcely necessary to mention it even to the patient. But when the splinter extends to the more solid part of the jaw, which in children especially is apt to happen, if the operation be not done with the utmost attention, as the sore which ensues proves commonly tedious, and as it will not readily heal as long as any loose pieces of bone remain in it, any of these that are perfectly detached should be taken away immediately; but as they are seldom so completely separated as to come away easily at first, no force should be used in it, as they will afterwards either fall out of themselves or will be taken away without any difficulty, on a free formation of matter taking place. After this, if the matter be prevented from lodging, and if the constitution be in other respects sound, the sore will probably heal with ease.

Hemorrhages of importance do not frequently occur from tooth drawing; for the blood vessels which supply the teeth being small, it is scarcely possible that much blood can be discharged by them. But when the roots of teeth are deeply fixed in the jaw, and when much force has been used in the operation, we can easily suppose that in this manner some of the larger arteries of the contiguous parts may be divided; and it is thus I imagine that any troublesome hemorrhagy which occurs here is ever produced. At first we advise the patient to take frequent mouthfuls of cold water, red wine, brandy, vinegar, or even alcohol; and for the most part one or other of these will prove successful; but when they happen to fail, other means must

must be employed, and the easiest of these is compression. A dossil of soft lint being fitted to the opening, must be pushed into it ; and the patient being desired to make a constant pressure upon it, by keeping the mouth shut, if this be persisted in for a sufficient length of time, it will very rarely fail. I have met with instances, however, even of every trial of this kind proving unsuccessful, and of fainting and other disagreeable symptoms occurring from the violence of the hemorrhagy. In such a situation the actual cautery is alone to be depended on ; and it must be applied with freedom, otherwise no advantage will be derived from it. A small bit of lunar caustic inserted into the opening might in some cases answer the same purpose ; but it does not act with such certainty as the other, while at the same time there is a greater risk of mischief being produced by it, from its being apt to spread so as to injure the contiguous sound parts.

The key instrument which we have recommended, is perhaps the best hitherto invented for the pulling of teeth in an oblique or lateral direction ; but there are several others which are used in different parts of Europe that act nearly on the same principles : These, however, being less perfect, will not all be delineated here ; but with a view to convey some idea of them to such as may not have an opportunity of seeing them, I have given a representation of two of them in Plate LX. figs. 1. and 2. But even these, although they are the best I have met with, are very inferior to the key : for they act with much less power ; and they have this great defect, that they can never be employed for pulling teeth towards the inside of the mouth.

We have thus described the method of extracting firm teeth from the back part of the mouth. Any of the fore teeth may likewise be pulled, as we have already observed, with the same instruments ; for they may be turned either inwards or outwards by a proper application of the key : but they may also be pulled in a different manner ; and as this may be done  
with

PLATE LXX

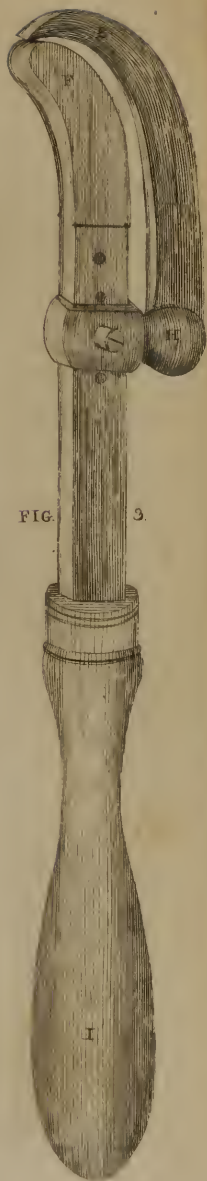
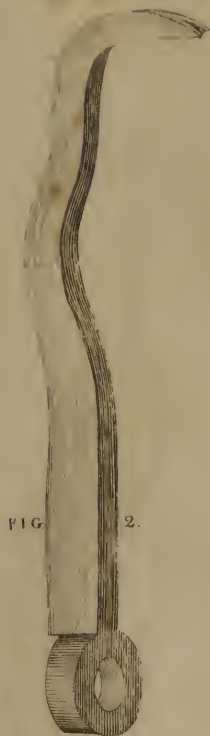
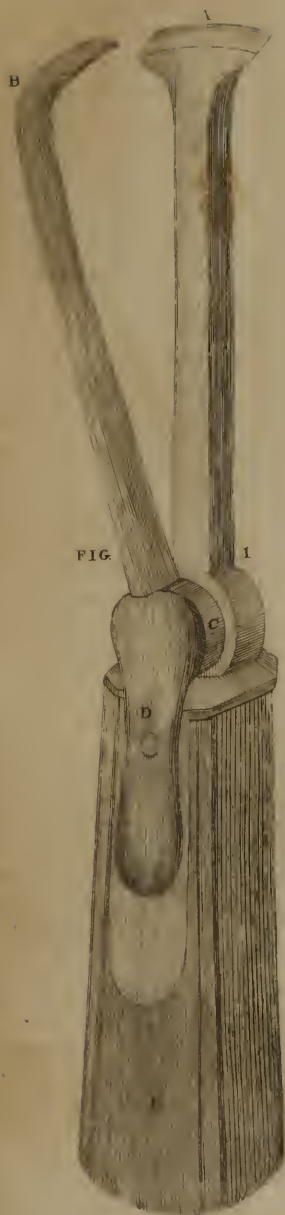




PLATE LXI.

FIG

1

FIG

2

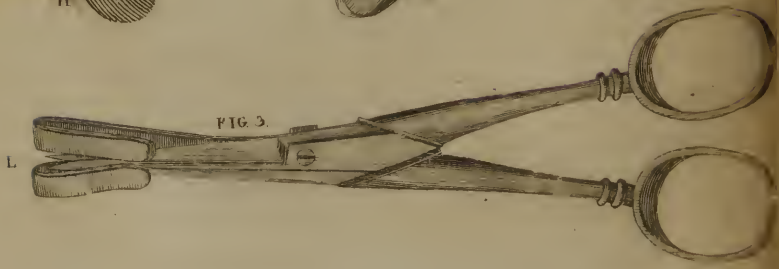
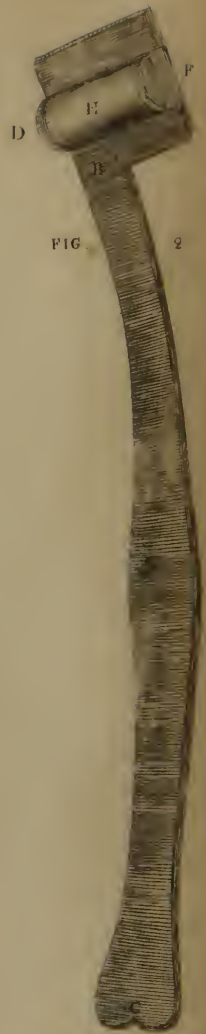
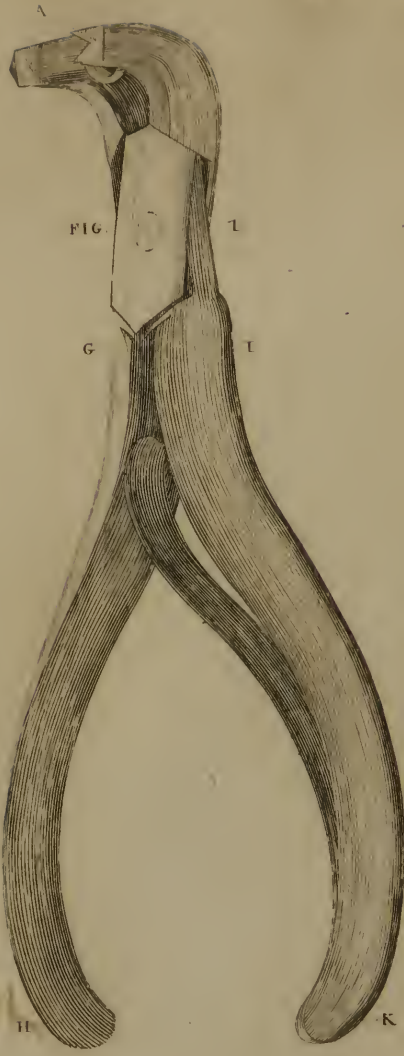
FIG

3









with instruments which do not bruise the gums, it should perhaps in every instance be preferred.

The incisores and canine teeth, and even the two small molares, have only one root; so that they are never so firmly fixed in the jaw as the large grinders; and therefore they may be extracted with more ease. For the most part this may be done with the common teeth forceps represented in Plate LXI. figs. 1. 3. or 4. In using this instrument, it should be pressed as far down upon the tooth as possible, otherwise it is apt to break off the corona or upper part of it, and to leave the root; and the tooth should not be pulled directly upwards, but should be twisted alternately from one side to the other till it becomes loose, when it may be taken out without further trouble.

In some cases, however, even these teeth are too firmly fixed to admit of their being pulled with this instrument: we have therefore given a representation of forceps that act with more power; a very ingenious invention first made public in the British Magazine in the year 1762. It is delineated in Plate LXII. figs. 1. and 2. Fig. 1. represents a common strong forceps with moveable claws. The axis of the claws is shown at *A*. Fig. 2. is a fulcrum. *B, C*, is the handle going off obliquely from *B*, by which it is more easily applied. *B, F, D*, is a plate of iron covered underneath with a piece of soft buff; and *E* is the other side of the same plate made round, smooth, and uncovered. The tooth intended to be pulled is laid fast hold of with the forceps, fig. 1. then the fulcrum, *B, F, D*, is placed upon the neighbouring teeth, when the forceps being placed upon the round part of the plate *E*, by a proper motion of the lever *G, H, I, K*, the tooth is in this manner to be extracted. In the pulling of loose teeth, this instrument may be used so as to draw them nearly straight up; and this we are told may be even done where the teeth are quite firm, provided their roots do not diverge much, and that there be no osseous adhesions between them and the sockets;

I.

but

but with a view to prevent any bad consequences that might occur from the application of much force, we are desired by the anonymous author of the instrument, instead of attempting to pull firm teeth directly upwards, to twist them a little outwards, which loosens them so much, that they may then be pulled almost in a perpendicular direction with much ease.

The advantages supposed to be derived from forceps with moveable claws is this : When the common forceps is used with immoveable claws, if the tooth be firm, it must either be forced out obliquely, or the first hold must be lost, and the instrument fixed again : but when the claws are moveable, it will always retain its hold, and the tooth will be pulled nearly in a perpendicular direction ; for the claws, by turning upon centres, will always fall into the way of the tooth ; and will therefore raise it very nearly in a straight line.

We have taken different opportunities of observing, that the most painful part of tooth drawing arises from the bruising and laceration of the gums and sockets ; a circumstance which cannot be altogether avoided when the key instrument is employed. The great object of the forceps we have just been describing being to pull in a straight direction, by which the gums and sockets are almost entirely saved, would render it the most complete instrument that has hitherto appeared, were it not liable to some very material objections. The ingenious author of this forceps thinks it may be employed for the extraction of any teeth ; even of the large molares : but, as the mouth cannot be so widely opened as to admit of the proper application of it, this should never be attempted. It must therefore be confined, as we have already observed, to the pulling of teeth in the fore part of the mouth. But besides this, as the fulcrum is placed upon the contiguous teeth, when the tooth to be pulled is firmly fixed, it is scarcely possible to prevent those from being hurt : for they will be very apt to suffer even when the pressure is made as nearly as it can be done in the direction of  
their

their roots ; and when this is not attended to with much exactness, they are apt to be broke, or even to be forced entirely from their sockets. In the pulling of all loose teeth, however, and whenever it is found that the fore teeth are not so firmly fixed as to require much force to move them, this instrument may be employed with much advantage. When again, it is discovered upon trial, that an unusual degree of force is necessary, a prudent practitioner will rather lay the forceps aside, and finish the operation with some other instrument. The common key, as we have already observed, may be used ; or either of the instruments, fig. 1. and 2. Plate LX. may be employed for loosening the tooth ; after which it may be taken out either with these or with the common forceps.

We have hitherto been supposing that the tooth to be pulled is only carious in a particular part, and that a considerable part of the corona is still remaining. When a tooth becomes so much diseased that the upper part of it falls entirely off, so as to leave little, or perhaps nothing, above the gums, the remaining part of it is thus reduced to what is commonly termed a stump.

In this stage of the disease, the connection between the remaining roots and the sockets undergoes a very important alteration. By the corona being removed, the roots, whatever number there may be, are all separated from each other ; for as they are united solely through the intervention of the corona, it is evident that their connection must be destroyed on this being taken away. In this manner their connection with the sockets is rendered not so firm as when diverging roots, tied together above, tend all to support each other ; but they become still more loose by a dissolving or wasting process, to which teeth in this situation are particularly liable. A considerable part of the corona of a tooth may become carious, and fall away, without any effect being produced upon the roots ; but I have scarcely known an instance of the corona being

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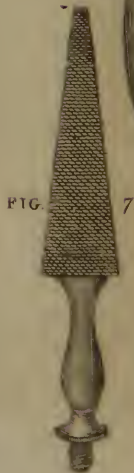
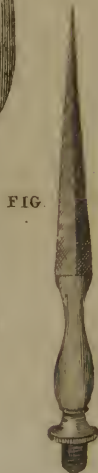
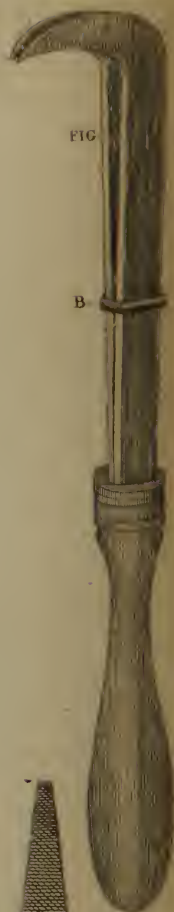
completely

completely removed for any length of time, where the roots did not suffer a remarkable diminution. Nay, in some cases, the roots, even of the largest molares, have been almost completely annihilated; and instead of the long fangs with which these teeth are furnished, only a small point or two of spoiled bone has been met with. In consequence of this they become loose; and their connection with the jaw being now very superficial, they may be forced out much more easily than it is possible to extract a large tooth. I know that practitioners in general are of a different opinion, the pulling of a stump being for the most part considered as a more difficult as well as a more painful operation than the extracting of a large tooth. This, however, can proceed only from want of experience in this branch of practice; for those who are more versant in it know well, that there is much more pain, hazard and difficulty, in the pulling of a complete tooth when firmly fixed, than in the taking out of several stumps.

When the point of the claw can be forced so far down upon a stump as to get a firm hold, it may be pulled with the key instrument in the manner we have advised for the extraction of large teeth; but this should not in general be advised, as we may commonly employ a sufficient force with instruments which do no injury to the gums, and by which a very painful part of the operation may be avoided. When the stump can be laid hold of either with the common forceps or with those with moveable points, this will be the easiest method of pulling it: but when it is so much spoiled as to be nearly, or perhaps entirely, covered with the gums, the points of the forceps cannot be pressed sufficiently down upon it; in which case, we are under the necessity of forcing it out with a simple lever. This instrument is commonly termed a Punch: different forms of it are represented in Plate LXIII. figs. 1. 2. and 3. In using it, the gums must be freely separated from the stump with a scarificator; and the point of it being pressed down upon the root, a degree



PLATE LXIII.



gree of force must be applied sufficient for raising it completely out of the socket: and this being done with one of the fangs, the instrument must be applied in a similar manner to the rest of them.

With those accustomed to the use of the punch, this operation is simple and easy, while with others it is often both difficult and tedious. In order to be able to apply as much force as possible, the point of the instrument is commonly pushed as far as it will go towards the root of the fang: But by this means much of the force that is employed is lost against the alveoli of the opposite side; which being firmer and stronger towards the base of the jaw, they do not so readily yield at this part as where they are thinner and not so firmly supported. In general, it will be found to answer better to push the instrument no farther down upon the fang than is merely necessary for procuring a sufficient rest for the point of it; for I know from experience, that a stump may be forced out in this way with much more ease than in any other manner. When it does not come out at once with the punch, but is merely loosened by it, it may in this state be laid hold of with the forceps, and removed in the manner we have already pointed out.

For the most part, a punch of such a form as is represented in Plate LXIII. fig. 1. answers best. With this the force is applied so as to push the fang towards the opposite side of the jaw; but it sometimes happens that the upper point of the root is of such a form as does not so readily admit of force being applied to it in this direction: in this case we employ a kind of hook or crooked lever, such as is represented in fig. 3. by which the stump is drawn or raised in a contrary direction.

I have thus described what by experience I have found to be the surest and easiest method of extracting teeth. A variety of instruments may indeed be met with in other authors, which I have not mentioned, and by which it is said, by the inventors of them, that the

operation may be done with more ease. But this not being supported by the result of practice and observation, it will not be expected that I should give any account of them.

§ 2. *Of Tooth Ach from Inflammation.*

The ordinary symptoms of tooth ach arise, for the most part, as we have already remarked, from the nerve being laid bare, either from a tooth becoming carious, or from the enamel being broke by external violence. It sometimes happens, however, in a very violent manner, merely from an inflamed state of the membrane surrounding the root of a tooth, or from the parts within the body of the tooth becoming inflamed. We judge of this being the cause of toothach, when a severe permanent pain attacks a tooth which outwardly appears to be sound : and this especially when it has been evidently induced by much exposure to cold ; or when it is connected with other symptoms of inflammation, such as an inflamed state of the contiguous cheek, swelling and suppuration in the adjoining gums, &c.

In most instances, we may be able to trace this variety of toothach to the cause we have mentioned, namely, exposure to cold ; in some cases, however, it proceeds from causes of a different nature. Whatever will produce inflammation in other parts of the body, will be attended with the same effect when applied to the membrane surrounding the root of a tooth : and we know from experience, that inflammation of this membrane is sometimes induced by a disease to which the roots of the teeth are liable ; what is termed the Swelling of the Fang, a hard knot or exostosis which now and then forms at the point of the root. At first, the pain induced by this may be supposed to originate from distension alone ; but ultimately it commonly terminates in a very severe degree of inflammation. And inflammation of these parts, by whatever cause it may be induced, is always attended with a more violent

lent pain than what commonly takes place from similar affections in other parts, owing to their being here surrounded with bone, which prevents them from yielding so readily to that distension of the vessels with which inflammation is always accompanied.

In the treatment of this variety of the disease, we will find in general, that those remedies prove most successful which answer best in inflammatory affections of other parts. Local blood letting, either by scarifying the contiguous gums with a lancet, or by the application of leeches, often gives relief. I have known the pain removed entirely by the application of a blister directly opposite to the part affected: and much advantage is often derived from a large dose of laudanum; for, by procuring a temporary diminution of pain, it thus lessens irritation, and hence an abatement of the inflammation itself. The head should be kept warm by covering it completely with flannel; a practice which should be inculcated with all who are liable to toothach, from whatever cause it may proceed, but particularly when it originates from inflammation; and in this case fomenting the head with the steams of emollient herbs, or even of warm water alone, will often procure relief when every other remedy has failed. In some cases indeed, cold water, vinegar, or ardent spirits taken into the mouth, prove serviceable; but for the most part warm applications prove more useful in this variety of toothach.

By a due perseverance in the use of one or other of these remedies, the pain will commonly be at last removed; and in toothach arising from inflammation, we are particularly induced to persevere in applications of this kind, from our knowing that the disease is not apt to return after it is once removed. But when they do not prove successful, we are under the necessity of advising the extraction of the tooth, which is often the only remedy to be depended on. In extracting a firm tooth, we have already advised it to be done in a slow gradual manner in every case, with a view to pre-

vent the tooth from breaking, and the jaw from suffering so much as it is apt to do when a tooth is forced quickly out. This caution, however, is more particularly necessary in the extraction of teeth under the circumstances we are now considering; for when the pain originates merely from inflammation, without any part of the tooth being spoiled, the roots are always entire, and more firmly fixed, than when the corona of a tooth is mostly consumed, and when the roots are always in some degree decayed. And besides, when the pain and inflammation are induced, as we have already remarked, by a swelling or enlargement of the fang, and which can never be previously discovered, if the tooth be turned quickly round, it will for certain break; and the swelled part of it being left behind, scarcely any advantage will be derived from the operation, while all the pain and distress with which it is usually attended will be severely felt by the patient.

On pulling a tooth which does not in any part appear to be carious, we are advised by some practitioners to replace it and to tie it to the contiguous teeth till it become sufficiently firm. This I have done in different instances; but I think it right to observe, that it is a practice which frequently fails, owing, I presume, to the experiment being tried with teeth in a state of inflammation. I know it will often succeed where a tooth has been merely productive of pain, and when no symptoms of inflammation have taken place; but whenever the membrane surrounding the roots of teeth, or even when the contiguous parts only are much inflamed, it will seldom or never succeed, while at the same time the trial of it will always be productive of much pain and distress. It ought not therefore to be advised indiscriminately in every case, as has frequently been done.

§ 3. *Of Tooth Ach arising from Affections of distant Parts.*

It is no uncommon occurrence to find all the symptoms of tooth ach produced in the most severe degree,

in one, two, or more teeth, where we cannot by the most accurate examination discover the least appearance of disease ; where we are therefore certain that no part of them is carious, and where there is every reason to conclude that the disease does not originate from inflammation.

In such circumstances, as the patient is at first always unwilling to part with a tooth which in other respects appears to be sound, all the remedies usually employed in tooth ach are made use of ; such as blisters, blood letting with leeches, the application of ardent spirits and strong essential oils to the pained part, &c. and after being for some days tormented with these, with little or no advantage, the pulling of the tooth, is recommended as a never failing remedy. Even this severe alternative is at last submitted to ; but unfortunately no benefit ensues from it. The tooth in which the pain seems to be most severe is first taken out : But the contiguous teeth becoming soon pained in an equal degree, they are from time to time all taken out, till at last I have known all the teeth of one side of a jaw extracted, and still the pain continue equally severe in the gums as at first.

In such circumstances, we will often find, that the pain in the tooth is induced by an affection of some other part, and that no remedy will prove effectual that is not directed to the original disease. It originates in some instances from rheumatism ; it has been known to proceed from an arthritic diathesis ; it occurs as a frequent symptom in hysterical affections ; pregnant women are frequently liable to it ; and it is often found to depend upon a foul state of the stomach.

When the pain originates from a foulness of the stomach, which may be often known by the state of the tongue, as well as other circumstances, no remedy proves so effectual as emetics. I have known the most violent tooth ach, which for many weeks had resisted the effects of every other remedy, almost instantaneously removed by a vomit : and when the stomach is  
once

once sufficiently cleared, a plentiful exhibition of Peruvian bark proves often effectual in preventing a return of it ; particularly where the fits of tooth ach have returned periodically, as they sometimes do, so regularly as to give cause to imagine that they depend upon a tendency to ague.

In this variety of tooth ach, arising from an affection of the stomach, no benefit is derived from laudanum. Instead of procuring ease, it seems rather to increase the pain, and, by inducing sickness, to render the patient in every respect more miserable. But in these varieties of the disease, originating either from rheumatism, from gout, or hysterical affections, opiates will for the most part remove the pain entirely : and a return of it may be frequently prevented merely by keeping the parts sufficiently warm. In hysterical patients, a combination of laudanum with ether has sometimes proved useful, when opiates in every other form have failed.

Opiates are often used too in tooth ach induced by pregnancy ; but seldom with advantage. In large doses indeed they sometimes procure a short relief from pain ; but nothing I have ever tried proves so effectual in preventing a return of it as blood letting. A plentiful discharge of blood, by the application of leeches to the neighbouring gums, will sometimes answer the purpose ; but as the pain in cases of this kind seems to originate from a general plethoric state of the system, it commonly proves more effectual to empty the vessels by taking away eight, ten, or twelve ounces of blood from the arm. I have known women immediately relieved by blood letting, who for several weeks had been liable to very violent degrees of tooth ach, and in whom neither tooth drawing, opiates, blisters, nor any other remedy, were productive of any advantage.

When a practitioner finds that he has pulled a tooth in the circumstances we are now describing, where there is neither inflammation nor much caries, he may  
with

with much propriety replace it. After clearing the tooth and socket entirely of blood, it should be put as nearly as possible into its natural situation; where it should be tied to the two contiguous teeth till it becomes sufficiently firm.

## S E C T I O N    X.

### *Of* TRANSPLANTING TEETH.

**T**HE advantages of a sound set of teeth, both with respect to beauty and utility, are so great, that we are not surprised at finding the fertile genius of modern artists employed in endeavouring to supply the loss of those which accident or disease may have occasioned. The method of supplying deficiencies of this kind with artificial teeth, and even of making complete sets of them, has been long known, and the art has by many dentists been carried to great perfection; but the transplanting of human teeth from one living body to another is the invention of modern artists. The mere proposal of such a nice operation was entitled to much credit; and in no instance does the art of surgery appear to more advantage than in rendering the practice of it perfect. It will readily be conceived however that it is not admissible in every case. Various circumstances must concur to render it practicable; but it may commonly be done wherever it is very necessary.

1. As it is in general more with a view to obviate deformity, than to be productive of any real advantage, that the transplanting of teeth is practised, it is seldom considered as necessary with any of the large molares. Indeed with these teeth it could not often take place; for as the roots of them often diverge in a very uncertain manner, and as the number and length of the roots can never be previously determined, it would for the most part be impossible to procure teeth exactly fitted to the vacancies intended to be filled up.  
The

The practice is therefore confined almost entirely to the incisores and canine teeth, although it may be done with nearly an equal certainty in the small molares; for in them the roots are either single, or if there are two fangs they are almost always united.

2. In order to ensure success, the alveoli and gums must be perfectly sound. They must be free from scurvy and the lues venerea; nor must the patient undergo this operation for a considerable time after a salivation. The use even of a small quantity of mercury frequently leaves such a soft spongy state of the gums, as renders it improper during the continuance of it to attempt any operation upon them. Hence those who are to have teeth transplanted, should carefully avoid even the risk of contracting any complaint for the cure of which mercury may be necessary.\* A patient being liable to gum boils has been considered as an objection to this operation; but where every other circumstance concurs to render it proper, it should not be forbid by this: for although it would not probably succeed where the surrounding socket is carious; yet we know that gum boils frequently occur where the socket is not in any respect diseased.

3. As the success of the operation will depend in a great measure not only on a sound state of the alveoli, but on the sockets being full and complete, it will seldom answer where teeth have remained long in the state of stumps: for in this state the roots commonly waste away so as to lose considerably both of their length and thickness; and the alveoli diminishing in nearly the same proportion, there is not sufficient space left for the roots of a sound tooth to be fixed in. It may always, however, be attempted where any considerable part of the corona of a tooth is left; for in this case the roots, as we have formerly remarked, are usually complete, however extensively the caries may in other respects have spread.

4. It

\* This caution is particularly inculcated by the very ingenious Mr. John Hunter, in his *Treatise on the Diseases of the Teeth*, page 98.

4. It is in youth and middle age only that this operation is admissible. In childhood and old age it should not be attempted. In childhood it is not probable that a tooth put in, in this manner, would ever become firm, as the approaching tooth of the second set would always be acting against it ; and besides, as any vacancy produced at this period will be filled up when the second set comes forward, it can never be in any respect necessary. In old age again, two strong objections occur to it. At this period the sockets of the teeth are commonly much diminished, particularly in depth : and in old age, when many of the smaller blood vessels become obliterated, it is not probable that any transplanted tooth, whether taken from a dead or a living subject, would ever become sufficiently firm : For, when the operation succeeds, as there is always a firm union produced between the tooth and the contiguous parts, by means of blood vessels passing from one to the other, we are led to imagine that this is necessary for the success of it. Now this, for the reason mentioned above, can never happen to any extent in advanced periods of life.

5. The transplanted tooth ought to fit the socket in every point as exactly as possible : but it should not require much force to insert it ; for if it be in any degree larger, either in length or thickness, it will create a great deal of unnecessary pain. The irritation produced by it will probably terminate in suppuration ; and in this manner the operation will be rendered abortive. Several people therefore should be provided for the purpose of furnishing teeth ; so that the operator may have no difficulty in finding one of a proper size : and it will frequently happen, that a tooth of the same size taken from one person, will fit the socket of the same tooth in another person very exactly. When it is found, however, that the roots of the tooth newly pulled are either too long or too thick for the socket in which they are to be placed, they should be filed down till they go easily in ; for it is not found  
that

that the removal of a small part of the root prevents the success of the operation. And care should be taken to make the surface of the transplanted tooth somewhat lower than the level of the contiguous teeth, so that no inconvenience may occur from those in the opposite jaw pressing against it. There is no necessity, however, for this difference being so considerable as to be very perceptible; for the smallest difference will answer the purpose, and a greater degree of it will always be attended with some deformity.

But although we have said that the roots of teeth to be transplanted may be lessened with a file, no part of the corona should be touched with it. It is sometimes indeed done by dentists, and it may in some instances succeed; but as it must always be attended with some risk of the tooth becoming carious, it should never be advised; and this especially as a very little attention will render it at all times unnecessary: for although we may be mistaken with respect to the size of the roots of a tooth, we have it always in our power to determine with exactness, whether the upper part of the tooth to be pulled will fit the vacancy or not.

6. In taking out the new tooth and removing the old one, much care and attention is necessary; for if the new tooth be much broke, or if the socket in which it is to be placed be much injured, the operation will not probably succeed. When it is possible therefore to take out the old tooth with the forceps, it is better to do it in this manner than with the key instrument, which can scarcely be used without injuring the parts too much.

7. When the tooth is removed, the socket cleared of blood, and the new tooth inserted under the restrictions we have mentioned, we are next to endeavour to keep it firmly fixed till an adhesion sufficient for retaining it takes place between it and the neighbouring parts. This must be done by tying it to the two contiguous teeth, and by much attention on the part of the patient to do nothing that can probably loosen it. In  
transplanting

transplanting a canine tooth, the ligature, which should be made of several plies of fine silk properly waxed, should be first tied round the upper part of the new tooth, immediately above where it begins to swell; and on the tooth being properly placed, it should be tied to the two contiguous teeth, taking care to pass the ligature as near as possible to the gums. But when an incisor or small molaris is transplanted, it answers better to fix the ligature first to the contiguous tooth near to the junction of the gums, and then to pass it over the surface of the new tooth, and bringing it again back, to fix it where it commenced, round the necks of the other teeth. In this manner the transplanted tooth is pulled down by the ligature into the socket; but much attention is necessary in this part of the operation to prevent it from being drawn too much either to one side or another; for nothing more certainly prevents it from proving successful than the new tooth being made to press upon either of the contiguous teeth. This, however, will never happen in the hands of an expert artist who has been sufficiently accustomed to this branch of practice; nor can it happen with any who is properly warned of the consequences that may ensue from it.

When the ligatures are properly fixed, they may not perhaps need to be renewed; but when they either slip off accidentally, or become in any degree loose, they should by all means be renewed immediately; and the patient should be constantly on his guard to avoid whatever might in any degree loosen or shake the tooth. Nor is it sufficient to attend to this for a few days only: the same kind of caution must be persisted in till the tooth becomes perfectly firm; and the length of time necessary for this will depend on the circumstances of every case: on the particular state of the alveoli; on the age and habit of body of the patient; and on the operation being done with more or less exactness. In some cases a tooth will become perfectly firm in the space of eight or ten days: while in others

others it will remain somewhat loose for two or three months. During all this period the patient should live as much as possible upon spoon meat : and he should guard particularly against cold ; for nothing renders the success of this operation liable to so much hazard as exposure to cold or dampness.

The most important objection that has been started to the transplanting of teeth, is the risk with which it is attended of communicating diseases ; and I must own that *à priori* it appears to be a very material one. It has not, however, been found on experience to be sufficient to counterbalance the advantages which are supposed to be derived from this operation : for it is daily practised ; and we seldom hear even of any suspicion of infection being carried into the system by it. I am not, however, of opinion, with those who think that diseases cannot be communicated in this manner. On the contrary, I think those practitioners do not deserve to be employed, who treat a matter of such importance to their patients with indifference. Teeth for the purpose of transplanting should never be taken from people with any appearance whatever of disease. Those only should be used which are taken from constitutions in which there is every possible evidence of health ; and with a view to prevent as much as it can be done, every risk of infection being conveyed in this manner, the tooth to be transplanted should be immersed for a few seconds in luke warm water, and should afterwards be entirely cleared of any blood or matter that may adhere to it, by rubbing it gently between the plies of a piece of soft old linen.

There is reason indeed to imagine, from the result of some experiments made with a view to inoculate the measles, as well as some other diseases, with the blood of those infected with them, that infection cannot be communicated in this manner. But the point is by no means so certain as to warrant our placing much dependence upon it.

## SECTION XI.

*Of the RANULA.*

**W**E frequently find tumors of different degrees of consistence seated beneath the tongue, sometimes on one side, and at others on both sides, of the frænum; which in general are distinguished by the term Ranula. They are seldom attended with much pain; but they become so large in some instances as to impede the sucking of infants, and the mastication, and even the speech, of adults. In such circumstances, the assistance of surgery becomes necessary in the treatment of them.

In some cases, tumors of this kind contain a fatty kind of matter: This, however, is rare; and for the most part, perhaps in nineteen cases of twenty, they are filled almost entirely with a thin limpid liquor very much resembling saliva; and we find, on cutting into them, that they are often produced by a stoppage of the salivary ducts from calculous concretions forming in them. They sometimes arrive at considerable degrees of magnitude; but in general the tumor bursts when of the size of a large nut, leaving an ulcer which is commonly difficult to heal, if the real cause of the disease be not discovered and removed. I have known an ulcer of this kind treated with much attention for the space of several months—various detergent and even corrosive applications being employed for it; nay, in one instance a long mercurial course was administered, but with no advantage whatever; and at last, on the true origin of the disorder being found out, it was cured in the space of a few days, merely by removing a portion of hard calcareous matter, which, by stopping the natural passage of the saliva, first produced the tumor, and afterwards prevented the ulcer, in which it terminated, from healing. In some instances concretions of this kind are small, not larger perhaps

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than the head of a middle sized pin ; whilst in others they are large. I have in different instances found them of the size of a kidney bean.

In every tumor of this kind that is not of a firm consistence, the most effectual mode of treatment is to lay it open with a scalpel from one end to the other ; by which any calcareous particles contained in it are easily discovered ; and these being removed, the remaining sore commonly heals easily. There is no necessity for washing the sore, as we are generally advised, with tincture of bark and other astringents : on the contrary, warm water and other emollients answer better, by washing out more effectually any particles of stone that may not have been previously discovered. When indeed the sore proves afterwards difficult to heal, the others may sometimes be employed with advantage.

The same kind of management should be pursued in the treatment of old fistulous sores of these parts. In almost every case where the disease is seated in any of the salivary glands or ducts, it will appear to be kept up by the cause we have mentioned, namely a stoppage of the duct by a particle of stone ; and the removal of this, by making an incision upon it, and turning it out with a probe or a scoop, will very commonly accomplish a cure.

When, again, tumors in this situation are of a fatty or even of a firmer consistence, instead of making an incision into them, they should be extirpated entirely ; and unless they lie deep, and are of a large size, it may always be done with safety. Practitioners are very properly indeed afraid of hemorrhagies in this situation ; for as the arteries lie deep, it is always difficult, and most frequently impossible, to secure such of them with ligatures as happen to be cut. But any tumor of this kind that is loose, and not deeply attached to the contiguous parts, may be taken out without any risk from subsequent hemorrhagies ; for as the superficial arteries of these parts are small, any discharge that occurs from them, in general, stops by the application of spirit

spirit of wine, alcohol, or tincture of myrrh. In more violent hemorrhagies, it would no doubt be proper to employ the potential or even the actual cautery ; but these means are seldom necessary.

In removing tumors of this kind by dissection, where they lie so deep that they cannot be easily laid hold of with the fingers, the common small forceps is usually employed ; but a small hook with two fangs, such as is represented in Plate L. fig. 3. answers better.

## S E C T I O N    XII.

### *Of ULCERS of the MOUTH and TONGUE, and extirpation of the TONGUE.*

**T**HE tongue and other parts within the mouth are liable to all the variety of ulcers incident to other parts of the body ; and we need scarcely remark, that the treatment of them should be nearly similar. When they seem to originate from the lues venerea, scrophula, or scurvy, our views should be chiefly directed to the cure of the general disorder of the system ; while, on the contrary, local applications only should be employed, when they appear to be of a local nature.

Besides other causes of ulcers, however, to which these parts are liable, it is proper to observe, that there is one to which they are more particularly exposed, and which appears to give rise to the greatest part of them, namely, ragged teeth. I have known very troublesome sores not only produced, but kept up for a great length of time, on the sides of the tongue, and on the insides of the cheeks, by the sharp points of broken or carious teeth ; and as long as the rough part of a tooth, which has once induced a sore of this kind, is allowed to remain, no remedy whatever will heal the sore. In every case therefore of ulcer in the mouth, we should inquire with much attention into the state of the contiguous teeth ; and when any of them are

found to be rough and pointed, they should be made as smooth as possible with one of the small files, Plate LXIII. fig. 5 or 6. Or when the fore appears to be induced by the formation of tartar upon the teeth, it should be effectually removed in the manner we have already advised in the eighth section of this chapter.

The removal of the cause is for the most part soon followed by a cure of the fore ; but when this fails, we frequently derive some advantage from washing the mouth with gargles composed of decoctions of bark, a solution of alum, lime water, infusions of red rose leaves, of oak bark, and other astringents.

In some cases, however, the sores become worse, notwithstanding the use of these, mercury, and every other remedy. They become ragged and unequal about the edges ; they discharge a thin, fetid sanies ; and in this state they are commonly attended with much pain.

As long as a sore of this kind remains small, without showing any tendency to spread, there is in general reason to expect a cure ; and therefore any violent remedy is considered as unnecessary : But whenever a sore has assumed the appearances we have enumerated, and when it does not yield to any of the means we have mentioned, as there will be little or no cause to doubt of its being of a cancerous nature ; we should certainly advise it to be removed by extirpation, and it ought to be done without farther delay.

A cancerous sore, whether it be seated on the tongue, or on the inside of the cheek, if it is only superficial, and does not run deep, may be extirpated with ease and safety ; but when the substance either of the cheek or of the tongue is much affected, it becomes an object of more importance, as being attended both with difficulty and hazard. Whatever the risk may be, however, if the diseased parts can be all removed, the operation should certainly be advised ; for as we know of no other remedy upon which any dependence can be placed for the cure of cancer, it is surely better to submit to some risk than to be left to certain misery.

When

When a deep seated cancer in the cheek is to be removed, the easiest and most effectual method of doing it is to make an incision through the whole substance of the cheek, commencing at the contiguous angle of the mouth, and ending at the same part, after surrounding the fore : The diseased parts being thus entirely removed, the sides of the cut must be laid as neatly as possible together ; and a number of gold pins being introduced at proper distances along the course of it, a cure will in this manner be completed by the twisted suture, in a manner similar to what is employed for the hare lip, described in Sect. I. Chap. XXX. In this way very extensive cancerous sores may be removed without leaving much deformity ; while a very disagreeable unseemly cicatrix is always left after the usual method of doing this operation, by removing the diseased parts only, and allowing them to heal without drawing them together by futures.

In removing any considerable part of the tongue with the scalpel, as the hemorrhagy which ensues is the only occurrence from whence any danger is to be dreaded, the operator should be previously provided with all the ordinary means of putting a stop to it. When ligatures can be passed round the divided arteries, no other remedy should be trusted ; and this, we may remark, may be done more frequently, and at a greater depth in the mouth, than is commonly imagined. As the tongue can be pushed a considerable way out of the mouth, ligatures may be applied for this purpose, even when a good deal of it has been taken away, merely with the common tenaculum, or with crooked needles ; but when this does not answer, it may sometimes be done in a manner similar to what we have described in Sect. V. Chap. XXVIII. for the removal of scirrhus tonsils. A ligature being passed round the artery with the needle used in fig. 3. Plate LI. it may then be tightly twisted by passing the two ends of it through the double canula, fig. 1. Plate

XLIV. or a knot may be formed upon it with the instrument, fig. 2. Plate LI.

When, however, it is found to be impracticable to surround the divided arteries either in this way or in any other manner, we must endeavour by some other means to put a stop to the hemorrhagy. If the vessels are not large, keeping the mouth filled with astringent gargles, either of alcohol, a strong solution of alum, distilled vinegar, or water strongly impregnated with the vitriolic acid, will often answer : But when these do not succeed, the potential, or even the actual cautery, must be employed as the last resource.

The removal of any considerable part of the tongue we must allow to be a very formidable operation : as such it has been always considered ; and accordingly it has been rarely practised. But, for the reasons mentioned above, I have no hesitation in saying, that it is sometimes necessary, and in general that it may be done with safety. It ought not, however, to be attempted by every operator ; for as it is always attended with a sudden discharge of blood, the application of means proper for the stoppage of this, obviating the effects of fainting, and other unexpected difficulties, which sometimes occur, require that steady deliberate coolness which a natural firmness of nerves, conjoined with much experience, alone can give.

## S E C T I O N XIII.

### *Of the Division of the FRÆNUM LINGUÆ.*

**I**T is sometimes found in children at birth, that the tongue is too closely tied down to the bottom of the mouth, owing to the frænum being either too short, or continued too near to the point of it. The method of cure is obvious. This membrane or ligament must be divided so as to allow the tongue to have a free easy motion ; and it should be done as soon as it  
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is observed to be necessary, otherwise the sucking of the child may in the first place be impeded, and afterwards an interruption to speech may arise from it.

It is proper, however, to observe, that it is not a common occurrence ; for although nurses often speak of children being tongue tacked, who either do not suck readily, or that are backward in speaking, an attentive practitioner will seldom discover it.

The division of this membrane is an easy operation ; but it must be done with attention, otherwise the contiguous blood vessels will be apt to be injured, by which such a quantity of blood may be lost as might prove hurtful to an infant : It is commonly done either with a scalpel or with common scissors ; but it is done both with more ease and safety with the instrument, fig. 3. Plate LXII. The child being laid across the nurse's knees, the surgeon should open the mouth and elevate the tongue with the index and middle finger of his left hand, while with the other he must introduce the instrument, so as to receive the middle of the frænum into the slit, which he may now divide with safety to any necessary depth.

## SECTION XIV.

### *Of the Division of the PAROTID DUCT.*

THE parotid gland of each side transmits the liquor which it secretes by a duct of the size of a crow's quill, which, after passing over part of the masseter muscle, penetrates the buccinator in an oblique direction, and empties itself into the mouth about the middle of the cheek.

In the operation which we have just described, of extirpating cancerous sores from the cheek, as well as by various accidents, this duct is apt to be cut ; and if the two divided ends of it be not retained together till they heal, it often happens that the whole quantity of

liquor which it ought to convey to the mouth is poured over the cheek ; and the discharge being constantly kept up, the sore is thus prevented from healing, and a fistulous opening left corresponding to the size of the duct. As the sore commonly heals altogether internally, the discharge would necessarily continue during life, if means were not used for preventing it.

In the case of a recent division of this duct, the best practice is to lay the two ends of it as exactly together as possible, and to retain them in this situation till they are united ; by adhesive plasters, when this proves sufficient ; or by the twisted suture, when the retraction of the divided muscle is considerable : But when this has either been neglected at first, or when it fails of success, as the distant extremity of the duct soon heals, and is entirely obliterated at the divided end of it, owing to none of the fluid secreted by the gland passing through it, the only way in which a cure can be obtained is to make an artificial opening into the mouth, and to endeavour to form an union between it and the upper part of the duct leading from the parotid gland.

In making a passage of this kind, we should carry it as much as possible in the direction of the natural duct ; but in order to insure the success of it, it should be rather of a larger diameter than the other. For this purpose a sharp pointed perforator of a proper size should be entered on the other side of the sore, exactly opposite and contiguous to the under extremity of the superior part of the duct ; and being carried with some degree of obliquity, it must in this manner be made to penetrate the mouth. This being done, a piece of lead probe, exactly the size of the perforator, should be introduced along the course of the newly formed opening, to be retained in it till the sides of it become callous ; when, the lead being withdrawn, the extremity of the duct should be drawn into contact with the superior part of the artificial opening by means of a piece of adhesive plaster, and kept in this situation till  
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a firm union has taken place. After taking out the lead, we have it in our power to forward the cure, by rendering the end of the duct and of the newly formed opening raw with the edge of a lancet or scalpel, before bringing them together. Till a firm adhesion takes place between them, the patient should be directed to live upon spoon meat ; to speak little or none ; and to make as little exertion with his jaws as possible.

In this manner, sores, which would otherwise continue to discharge saliva for life, may be easily healed, with scarcely any mark of their having ever existed. I have had three different instances of it ; in all of which complete cures were obtained. A common seton or cord of cotton has been recommended for this operation instead of lead ; and a bit of catgut has been used instead of it : but nothing renders the parts so quickly callous as lead ; and besides, it is more cleanly than a cord or tent of any softer substance.

## CHAPTER XXXI.

*Of the DISEASES of the EARS and Operations practised upon them.*



## SECTION I.

*Of DEAFNESS.*

**D**EAFNESS may proceed from various causes : for as a free passage of sound to the Tympanum or Drum of the ear, together with a sound state of this membrane and of the parts connected with it, are requisite for the sense of hearing, so whatever tends to obstruct the one, or to induce diseases of the other, will necessarily be productive of more or less deafness.

There are two passages for the purpose of conveying sound to the ear ; one of them termed the Meatus Externus, terminating in the external ear ; and the other the Tuba Eustachiana, ending in the throat. It is true that the first of these is of more importance than the other, for it is larger, and more conveniently placed for collecting sound : but it is certain that the latter or internal passage is a very necessary part of the organ of hearing ; for when by any means it is stopped, deafness to a greater or lesser degree almost constantly ensues. Thus we observe, that any preternatural fullness or enlargement of the amygdalæ, especially when they are attacked with inflammation, is always attended with some degree of deafness. In this way, too, we account for that deafness to which patients are liable who have suffered much from venereal ulcers in the throat ; and polypous excrescences which extend back from

from the nose and fauces, by compressing the Eustachian tube, are frequently productive of a similar effect.

In that variety of deafness which originates from this cause, a removal of the polypus, or of the swelled amygdalæ, will frequently accomplish a cure, while no other remedy will be of any utility. But when the disease is the consequence either of an ulcerated state of these parts, or of much inflammation, as the extremity of the duct will probably be obliterated, it would be in vain to employ any means whatever. It has indeed been proposed in this variety of obstruction, to endeavour to open the duct, by inserting the end of a curved blunt probe into it, or even to inject milk and water, or any other mild fluid, into it with a curved syringe. But although a person well acquainted with the anatomy of the parts, may, by much practice, arrive at such perfection as to be able to do this with little difficulty upon a dead body, there is scarcely any reason to imagine that in practice any advantage will be derived from it : for even in a healthy state of these parts, the irritation produced by the end of a probe or of a syringe must be so considerable as to render every attempt for inserting them, very uncertain ; and the difficulty must necessarily be greatly increased where the extremity of the duct is obstructed by disease. But if we have not much in our power in the treatment of deafness arising from this cause, we are in many instances able to afford much relief, and even to restore the most perfect hearing where it has been entirely wanting, when the disease proceeds from obstruction in the external passage of the ear.

The meatus externus may be obstructed in various ways. It may be in an imperforated state at birth ;—it may be more or less filled with extraneous bodies forced into it ;—tumors or excrescences may form in it ;—and it may be too much stuffed with wax, the natural secretion of the part. As each of these causes  
requires

requires a method of treatment peculiar to itself, we shall consider them under separate heads.

§ 1. *Of an Imperforated Meatus Auditorius.*

Among other natural deficiencies to which the human body is liable, none occurs more frequently than an imperforated state of some of the passages. This is not so frequently met with in the Meatus Auditorius as in others, owing perhaps to the lining membrane of this passage being every where attached to bone, by which it is prevented from collapsing. Notwithstanding, however, different instances have occurred of it, and some variety is discovered in the nature of it.

In some cases the obstruction is formed by a thin membrane spread over the mouth of the passage; while in others a considerable part of the conduit is entirely filled with a fleshy kind of substance.

In the treatment of this variety of deafness, nothing, it is evident, can be of any advantage but the removal of the cause by an operation. When this is determined upon, the patient's head should be secured in a proper light, and at a convenient height, by an assistant; when the operator, with a small sharp pointed bistoury, should make an incision of a proper length exactly on the spot where the external passage of the ear should terminate. If it is covered by a membrane only, the operation will soon be finished; but when it is impervious to any great depth, the incision must be continued, by passing the bistoury in a gradual manner farther in, either till the resistance is entirely removed, or till there is reason to fear that the tympanum would be hurt, if it were carried deeper; In which case the instrument should be withdrawn; and in order to prevent the parts from adhering together, a bit of bougie properly oiled should be introduced, and retained till the cure is completed; care being taken to remove it daily for the purpose of cleaning it,  
and

and for wiping off any matter that may have collected in the ear.

In this manner deafness depending upon this cause may often be removed when the obstruction lies between the tympanum and the farther extremity of the external passage; and it should be always attempted about the time when the child should be beginning to speak. At a more early period the child would not be so able to bear it; and when delayed much later the speech would be impeded; for we know that dumbness depends more frequently on a want of hearing than on any other cause.

§ 2. *Of Extraneous bodies impacted in the Ear.*

Although the viscid nature of the wax of the ears is well calculated for preventing dust and other foreign matters from getting access to them, yet we know that much distress is in some instances induced by this cause. Children often push small peas, cherry stones, lead drops, and other such articles into their ears, and flies and other insects frequently creep into them.

When these lie near to the extremity of the passage, flies and other things that can be laid hold of should be extracted with small forceps, such as are delineated in Plate LXI. fig. 2. But peas and other round bodies are more easily removed, by turning them out with the end of a curved probe, or passing the instrument, Plate XLII. fig. 1. behind them; and their extraction is facilitated by a little oil being previously dropped into the passage.

When insects have got so far into the ear that they cannot be taken out with forceps, the best method of removing them is to wash them out, by throwing in quantities of warm water, or any other mild liquid, with a syringe; but as they adhere while living with considerable firmness to the neighbouring parts, we should first endeavour to kill them, by filling the ear with oil, or any other liquid that proves poisonous to them, without injuring the tympanum. Lime water,  
spirit

spirit of wine, and many other articles, might be employed for this purpose : but nothing proves so harmless as oil ; and although it does not kill every species of insect instantaneously, yet few of them will live if immersed in it for any length of time. The patient should therefore be desired to rest his head upon the opposite side ; and some tepid oil being poured into the affected ear, it may thus be easily kept in it as long as may be necessary.

Peas and other soft bodies which swell with moisture, are apt to become so large when they remain long in the ear, that they cannot but with much difficulty, be extracted entire. In this case we should endeavour to break them, either with the points of small forceps, or with a sharp small hook cautiously introduced along the passage ; and as soon as they are sufficiently divided, they must either be taken out piecemeal with the forceps, or washed out with a syringe.

### § 3. *Of Excrescences in the Meatus Auditorius.*

We have already treated of polypi in the nose and throat ; and we may now remark, that the external passage of the ear is equally exposed to them. It is not indeed common for excrescences of this kind in the ear to arrive at such a bulk as they do in the nose ; but whoever has paid attention to this branch of practice, will acknowledge that they are by no means unfrequent, and they often appear to be the cause of very obstinate deafness.

On examining the Meatus Auditorius, we sometimes find it filled with a polypous excrescence hanging loose by one pedicle ; while on other occasions the passage is obstructed merely by a thickness or fullness of the lining membrane of the ear, when no particular part of it appears to be more affected than another.

As the polypi of this part are usually of a firmer texture than those excrescences which occur in the nose, and as the membrane of the ear is firm, and does not readily yield, they cannot with propriety be extracted

tracted with the forceps; but they may be taken out either with the knife or by ligature. When they lie near to the external passage of the ear, and can be laid hold of either with small forceps, or with the dissecting hook, Plate L. fi. 3, they may be easily cut out with a probe pointed bistoury, such as is represented in Plate LII. fig. 3. and as they do not appear to be so vascular as similar excrescences in the nose, they may in this manner be removed with safety; for they seldom discharge much blood. But when they lie deep, it is better to remove them with ligatures; for as the passage is straight, a knife is in this situation introduced with difficulty and used with uncertainty.

Various methods have been proposed of applying ligatures to excrescences in this situation; but the method of removing polypi of the nose, described in the explanation of Plate XLVI. appears to be more advisable than any of them. With the forked probe, fig. 2. the doubling of a ligature may be pushed up at one side of a polypus till it reaches the root of it; and the two ends of the thread being carried round the excrescence, and inserted into a short double canula, such as is delineated in Plate XLIV. fig. 1. the canula must now be pushed to the root of the polypus on the opposite side; when the two ends of the ligature being drawn sufficiently tight, and fixed upon the knobs at the end of the tube, the probe may be withdrawn, and the polypus in all probability will drop in a day or two.

But it often happens, that these excrescences cannot be removed in this manner; for instead of being pendulous by a small neck, they frequently extend a considerable way along the lining membrane of the ear. In this case escharotic applications have been recommended: but as they cannot be employed but with much risk of hurting the tympanum, they should never be used; and this especially as the disease may in general be removed by means of a more simple nature. This affection of the membrane of the ear I consider

to be very similar to that variety of obstruction in the urethra in which bougies prove particularly useful; and the same remedy, when duly persisted in, proves equally serviceable in the one disease as in the other. In the introduction of the bougie, care must be taken not to pass it to the depth of the tympanum, otherwise it may do more harm than good; and the size of it must be enlarged from time to time till the passage is rendered sufficiently open.

When bougies are first passed into the ear, they are apt to create some degree of uneasiness, by irritating the parts to which they are applied; but this soon subsides when they are employed with caution, and properly oiled before being introduced.

#### § 4. *Of Deafness from Wax collected in the Ears.*

Whether it be from the lining membrane of the ear being possessed of some degree of a contractile power, or from the outward extremity of the passage being somewhat lower than the other; that the cerumen or wax does not usually lodge in it is perhaps difficult to determine; but it is certain, that in a healthy state of these parts they are for the most part only thinly covered with this secretion: so that it does not appear surprising that deafness should ensue when it is collected in large quantities; for in this state it very effectually obstructs the passage of sound to the tympanum. It commonly happens too when wax remains long collected in the ear, that it becomes thick, and even hard, insomuch that in some instances it becomes almost as firm as a bit of timber.

The treatment of this variety of deafness is very obvious. By an attentive examination of the ear, we can distinguish with certainty whether there be a superabundance of wax or not: for by placing the ear in a clear sunshine, we can see even to the tympanum; and whenever it is observed that the passage is much obstructed with wax, we should not hesitate in advising it to be removed.

Different

Different methods have been proposed for clearing the ears of wax ; but the safest and easiest is by washing or syringing with warm water or any other mild liquid, so as to force out all the stuff that is collected. Milk and water, or soap and water, answer the purpose as well as any other article : but before the operation a few drops of oil should be poured into the ear, not with a view to dissolve the wax, for more powerful solvents of this substance might be mentioned ; but for the purpose of lubricating the passage, by which it is more easily forced out. By a proper use of the syringe, which a little experience will teach, the ears may be effectually cleared of every obstruction proceeding from wax.

Although obstruction of the external passage of the ear is the most frequent cause of deafness ; yet it is proper to know, that in some instances it is produced in a different manner. It may occur from a morbid state of the tympanum, and of the parts contained within it. To a certain degree it will take place, if either by accident or disease the external parts of the ear be destroyed ; and it sometimes occurs from a deficiency of wax.

In scrophulous constitutions the small bones of the ears sometimes become diseased ; in consequence of which, a great degree of deafness is produced which is never in any instance removed. In such cases all that art can do, is to preserve the parts clean and free from smell, which is most effectually done by washing out any matter that may collect in the passage, morning and evening, by throwing in a little warm milk and water with a syringe : for if this be not attended to, the matter discharged from the carious bones is apt to become offensive ; and it commonly subsists either till the diseased parts of the bones are entirely dissolved and discharged, or perhaps during the life of the patient.

We ought not, however, to confound this disease with a discharge which frequently takes place from the ears, of a milder nature. In some cases it appears to

be the consequence of a bile or abscess in the meatus externus ; while in others it occurs without any previous imposthume, and seems to be induced by some slight inflammatory affection of the lining membrane of the ear, or perhaps of the tympanum itself.

This is a very common occurrence, and for the most part I think it is improperly treated. In general it is supposed to originate from morbid humours in the system ; so that some risk is supposed to attend any attempt that may be made for stopping it.

This however is an erroneous idea. In most instances it may be traced to the cause I have mentioned, an inflammatory affection of the membrane of the ear ; which being of a local nature, no risk can ensue from checking it. And accordingly I very commonly treat it with injections of a moderately astringent nature, nearly such as often prove effectual in putting a stop to the discharge of a gonorrhœa. A weak solution of alum, or of saccharum Saturni, frequently answers, or French brandy somewhat diluted. In some cases, putting a few drops of any of these into the ears, morning and evening, will prove sufficient ; but when this fails, they may be gently thrown in with a syringe.

It is proper to remark, that the earlier in the disease this practice is employed, the more effectual it usually proves ; so that it should never be long delayed. And besides, when the discharge has been of long duration, it is not only apt to do harm, by relaxing, or even destroying the tympanum, but some risk may occur from putting a sudden stop to an evacuation to which the system has been for some time accustomed. The danger, however, may be obviated by the previous introduction of an issue somewhat adequate to the discharge from the ear, either in the head, neck, or any other part ; but in recent cases of this kind there is no necessity for putting the patient to any of the inconveniencies with which an issue is sometimes attended ; for here the discharge may with safety be stopped immediately.

When



PLATE LXIV

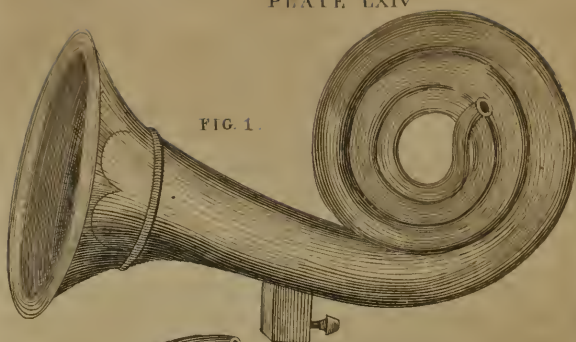


FIG. 1.

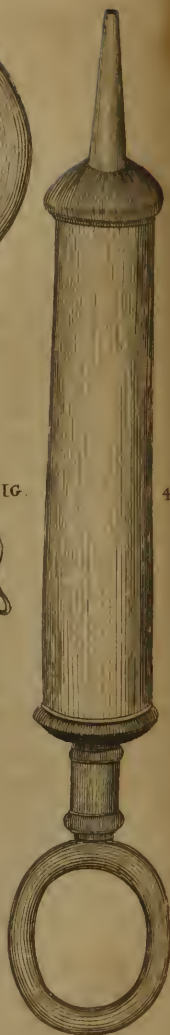


FIG. 2.



FIG. 3.

FIG.



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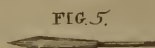


FIG. 5.

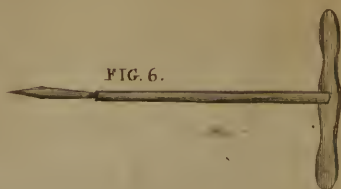


FIG. 6.

When deafness occurs either from relaxation of the tympanum, or from any deficiency in the external parts of the ear, some assistance may be derived from our endeavouring to collect or concentrate sound, so as to make a stronger impression on the organ of hearing. Various instruments have been invented for this purpose; but none of them answers so well as one nearly of the form of a common horn, such as is represented in Plate LXIV. fig. 2. Figure 1. is a convoluted tube employed for the same purpose; and fig. 3. represents an instrument intended to be concealed beneath the hair or wig, and to be fixed to the head by the two strings connected with it.

When, again, a deficiency of wax is suspected to be the cause of deafness, dropping a little oil of almonds, or any other mild oil into the ear, once or twice daily, proves sometimes useful. In some cases too I have known advantage derived from inserting a little soft soap into the passage; which not only keeps it moist, but by acting as a stimulus to the lining membrane of the ear, tends thus to induce a return of the secretion of wax. With the same view too, I have sometimes employed strained galbanum made into a proper consistence with oil, along with a small proportion of the juice of an onion.

## SECTION II.

### *Of perforating the LOBES of the EARS.*

**B**Y some medical writers of the last and preceding centuries, piercing the lobes of the ears is recommended as an operation that may prove useful in some disorders, particularly in affections of the head. In those times, a small seton was drawn through the opening, with a view to induce a discharge of matter, which in some cases might prove useful. At present this operation is never employed but for the purpose of ornament.

This is perhaps the most simple of all operations ; but as it is supposed to be of some importance by those on whom it is practised, it is necessary to describe it. As heavy ear rings are apt to tear the parts, the opening should be made as high on the lobe as with propriety it can be done ; and the spot should be previously marked with ink. The patient being seated, and the head secured by an assistant, the lobe of the ear should be stretched upon a piece of cork placed beneath it. The surgeon is now to pierce it with the instrument, fig. 6. Plate LXIV. and having pushed it so far through that the tubular part of it is freely out on the opposite side, the cork must be withdrawn with the perforator stuck into it. A small piece of lead wire is now to be inserted into the tube remaining in the ear ; and on being drawn into the perforation, the lead must be left in it. By moving it daily, which may be done with little or no pain, if it be previously rubbed with oil, the passage will soon become callous, and thus the operation is completed.

Before concluding the chapter on the diseases and operations upon the ears, it may be expected that we should describe the method of cauterising or burning behind the ears for the tooth ach. At one period this operation was much employed, and different instruments were proposed for doing it. It is unnecessary, however, to delineate any of them ; for the practice is now, we presume, very generally laid aside : and at any rate it may be done with a red hot probe of any kind equally well as with the neatest instrument. It was supposed to prove useful by burning or destroying the nerve producing the pain : but it would rather appear to act by inducing terror or surprise ; and if this is the case, it is probable that the same operation would prove effectual if practised in any other part. But as the pain attending it would by most people be considered as more severe even than the pulling of a tooth, it is not probable it will ever be revived.

## C H A P T E R   XXXII.

*Of the WRY NECK.*

**T**HE Neck is sometimes considerably bent to one side : When this takes place to such a degree as to be productive of much deformity, the assistance of surgery is in some instances employed for it.

The Wry Neck may be produced in various ways. It may depend upon an original malconformation of the bones of the neck—upon a preternatural degree of contraction in the muscles of one side of the neck, particularly of the sternomastoideus muscle—or, it may be induced merely by a contraction of the skin, in consequence of extensive sores and burns.

When the vertebræ of the neck are distorted, it would be in vain to attempt any means of relief ; but either of the other causes we have mentioned seem to admit of almost a certain removal.

In books of surgery the operation for the wry neck is very commonly described ; and as this deformity has in general been imagined to proceed solely from a contraction of the sterno mastoid muscle, a division of this muscle is usually recommended as the only method of cure that can be depended on. Even Mr. Sharpe was of this opinion ; and he delineates an instrument termed a probe razor for performing it.\*

But were we even to admit that the division of this muscle was a necessary measure, the method of doing it by introducing the probe razor beneath it and dividing it afterwards, as is recommended, appears to be exceptionable, as being attended with much risk of wounding the contiguous blood vessels : it would surely

ly be better to divide the muscle by repeated strokes of a scalpel, and to continue the incision in a gradual manner to such a depth as may be necessary; by which even the large veins of the neck would be avoided. But although we allow that a wry neck may be sometimes produced by a contraction of this muscle, yet it appears to be a rare occurrence: I have met with different instances of this deformity, and in all of them the contraction seemed to be in the skin alone.

When the skin only is affected, the parts are more easily separated and with less risk than when any of the deep seated muscles are to be divided: but even this should be slowly done, so as to avoid the external jugular veins; for although no great detriment might ensue from their being cut, we should run no risk of wounding them unnecessarily. But whether the cause of contraction be seated in the sterno mastoid muscles or in the skin, the incision should be carried so deep as to remove it effectually, otherwise little or no advantage will be gained by the operation.

We ought not, however, to conclude, that our object is accomplished by the mere division of the contracted parts; for unless some method be employed to support the head during the cure of the sore, it will still be apt to incline more to this side than to the other, by which the parts newly divided will readily unite, so that no advantage will be gained by the operation. By Mr. Sharpe and others we are indeed advised to stuff the sore with lint, so as to prevent this inconvenience with as much certainty as possible; but I know from experience that this does not succeed, and that nothing will answer but a firm support being given to the head. For this purpose the instrument represented in Plate LXVI. fig. 1. will be found very useful; It was made for a case of this kind, in which it was used for several weeks, and with complete success. It should always be wore not only till the sore is healed, but for some time thereafter; and if properly fitted to the

the parts upon which it rests, it is used without any uneasiness.

The skin beneath the chin is sometimes so much contracted in consequence of burns and other causes, as to draw the head considerably down upon the breast: the same method of cure must be practised for it that we have just recommended for the wry neck. The contracted skin must be freely divided with a scalpel, and the head must be properly supported from behind till the sore is cicatrised.

## CHAPTER XXXIII.

*Of DISEASES of the NIPPLES.*

THE Nipples are in some cases so deeply sunk in the breast, that a child in attempting to suck, finds it difficult or even impossible to lay hold of them.

To remedy this inconvenience, different means are employed. If the prominent part of the breast can be pressed so far back as to uncover even a small part only of the nipple, it may commonly be drawn out by laying a stout child of six or eight months old to suck it : But as this cannot be always done, glasses of different kinds are employed for the same purpose. In Plate LXV. fig. 1. and 3. represent two forms of glasses with which the breast may either be sucked by the patient herself, or by an assistant ; and fig. 2. is a glass cup, mounted with a bag of elastic gum. In using this the air must be pressed entirely out of the bag, when the cup being placed upon the breast so as to include the nipple, such a degree of suction is produced as has a considerable effect in drawing it out. The bag, however, should be much larger than it is commonly made ; for when of the ordinary size, it does not act with sufficient force. But which ever of these means is employed, it ought to be persisted in till the nipple is drawn fully out ; and this should be always done immediately before the child attempts to suck.

The nipples, like every other part of the body, are liable to ulcerations ; but from their peculiar delicacy, any sores with which they are attacked, are always productive of much distress, while the sucking of the child tends not only to render them worse, but of much longer duration than they otherwise would be. Cracks

or









FIG. 1.

FIG. 2.

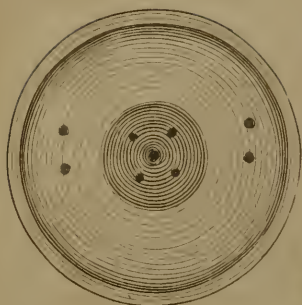


FIG. 3.

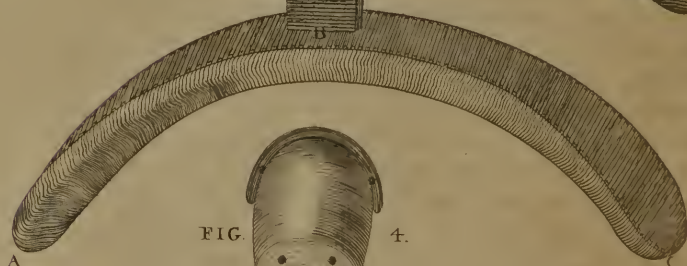
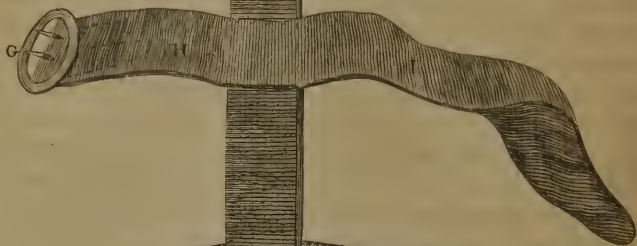
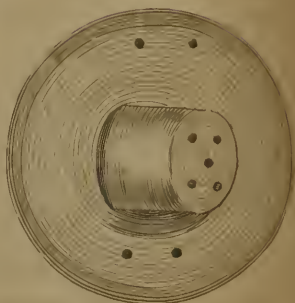


FIG. 4.



FIG. 5.



or chops in the nipples have not a formidable appearance, but they are commonly much more painful than ulcers of the greatest extent.

Various remedies are employed for these affections, but emollients are most frequently used : I have not found, however, that applications of this kind afford any permanent relief ; for although they may give temporary ease, this seldom if ever proves of long duration. Mild astringents and drying applications are more to be depended on. As a wash, lime water proves often useful ; and Port wine and water, or brandy sufficiently diluted, may be employed for the same purpose. After bathing the parts with one or other of these, the nipple should be covered with a bit of soft lint spread with Unguentum Nutritum or Goulard's cerate ; but of these the first is the best : I have often used it with advantage, and I know of nothing that answers so well in chops or cracks wherever they are situated. I find too, that it is much employed by my friend Dr. Hamilton, Professor of Midwifery in this University ; whose practice being very extensive, his authority may be relied on. It is proper, however, to observe, that the nipple should be entirely cleared of this application always before the child is allowed to suck ; for as lead forms the basis of it, mischief might ensue from much of it being carried into the stomach.

Till the nipple is completely healed, the child should not be allowed to suck oftener than is altogether necessary ; and when one of the nipples only is sore, this may be managed with little difficulty, as the child may be kept at the sound breast while the other may be drawn from time to time with a glass, which does not injure the nipple. In Plate LXVI. figures 2. 3. and 4. some small cups are represented for protecting the nipples during the cure. When properly fitted to the parts, they not only protect them from the friction of the clothes, but allow the milk to run off as quickly as it falls from the breast.

## CHAPTER XXXIV.

*Of ISSUES.*

**I**SSUES are small artificial ulcers which we form in different parts of the body, for the purpose of procuring a discharge of purulent matter.

As I have elsewhere treated fully of the advantages that may be derived from issues, and of the manner in which they seem to act in the cure of diseases, it is not at present necessary to enter minutely upon this part of the subject: I shall therefore only observe in general, that I am daily more and more convinced of the utility of issues in the cure of long continued sores, of whatever kind they may be; and that I am still of the opinion that they act solely by discharging a certain quantity of the serous parts of the blood; and not that they serve merely as drains for the noxious humors in the blood, which till of late has been the prevailing idea upon this point.\*

Among other errors in practice which this opinion gave rise to, the choice of situation for issues was none of the least remarkable. As it was imagined that ulcers as well as other local affections were produced by a determination of morbid humor to a particular spot, when issues were advised, it was considered as necessary to place them as contiguous to the affected part as possible, and always on the superior part of the limb, when the disease was seated on any of the extremities, in order to prevent the morbid matter from falling down to it. But as we now conclude that issues prove useful or otherwise, merely by the quantity of matter which

\* See a Treatise on the Theory and Management of Ulcers, Part II. Section I. where this subject is more fully considered.

which they afford, it appears to be of little importance where they are placed ; and accordingly they may be inserted wherever the patient thinks they will occasion the least inconvenience.

There are some general rules, however, which should be attended to in the introduction of issues : They should never be placed immediately above a bone thinly covered, nor directly above a tendon, nor very contiguous to a large blood vessel or nerve, nor upon the belly of a muscle. The best situation for issues is that space which lies between the tendons on the back part of the neck, where there is a considerable depth of cellular substance ; the middle of the humerus, near to the insertion of the deltoid muscle ; and a considerable hollow above the flexor tendon on the inside of each knee. They may likewise be inserted between two of the ribs, and on each side of the vertebræ of the back ; or in short wherever there is a sufficient quantity of cellular substance for the protection of the parts beneath. It is proper, however, to remark, that the spot usually fixed upon for issues is perhaps the most improper of any, I mean directly below the knee ; where there is never much cellular substance ; where the veins of the leg can scarcely be avoided ; and where they are apt to hurt the contiguous tendons.

There are various ways of forming issues : By corroding or removing the skin with epispastic applications ; by making an incision with a scalpel or lancet ; by the application of caustic ; and by the introduction of a cord.

When an issue is to be opened by removing a portion of skin, a blister must be applied upon the spot exactly of the size of the intended sore ; and on the blister being removed, a discharge of matter may be kept up, by dressing the part daily with any of the common ointments in which there is mixed a small proportion of cantharides in fine powder : Or, it sometimes proves sufficient to use an irritating applica-  
tion

tion of this kind, and a mild ointment of wax and oil alternately.

In forming an issue by an incision, or with caustic, an opening must be made of such a size as appears to be sufficient for affording a proper quantity of matter; and the opening must be preserved by inserting daily into it some extraneous body covered with any mild digestive ointment, such as basilicon or linimentum Arcæi, while the whole must be secured with a proper bandage. Peas are commonly employed for this purpose. Kidney beans answer very well; and some make use of gentian root, and of aurantia Curaflaventia, usually termed Orange Peas, turned into a proper form. When the opening is made by an incision, the skin should be supported on one side by an assistant, and on the other by the left hand of the surgeon; who should now with a scalpel in the other make a cut of a sufficient length and depth for receiving the number of peas intended to be put into it, and thus the operation is finished: But when it is to be done with caustic, more attention is requisite. The common lapis infernalis of different Dispensatories answers best: many compositions of caustic paste have been recommended; but I have met with none that for this purpose answers so well. It should be first reduced to powder, and made into a paste with a little water, or with soft soap, when as much of it should be applied upon the spot where the issue is wanted as will make an opening of a proper size; but as it is apt to spread to the contiguous parts, some care is required to prevent it. For this purpose a piece of leather spread with Burgundy pitch, or any adhesive plaster, with a small hole cut in the centre of it, should be placed upon the part with the opening directly above where the caustic is meant to be applied. The small spot which is thus left uncovered, must now be spread with some of the caustic paste; and over the whole there should be laid another piece of leather, spread with the same kind of adhesive plaster, so that there  
may

may be no chance of any part of the caustic escaping. In the course of ten or twelve hours, the whole may be removed ; for before this, if the caustic is good, it will have produced an eschar of a sufficient depth. In the space of three or four days, the eschar will separate from the contiguous sound parts, when the opening formed by it must be filled with peas or some other of the substances we have mentioned.

When it is an object to discharge a large quantity of matter by an issue, and especially when we wish to have it from deep seated parts, we do it by the introduction of a cord of cotton or silk, forming what is commonly termed a Seton. This remedy is often used with advantage in deep seated pains, particularly in pains of the breast and sides in cases of phthisis pulmonalis. In such cases it is commonly inserted between two of the ribs ; and it answers better in the direction of the ribs than when placed across them, as is sometimes done. A cord is a frequent remedy too in affections of the head, particularly in ophthalmia and other diseases of the eyes ; and in such cases it is usually placed in the back of the neck.

When we mean to introduce a cord, the parts at which it is to enter and pass out should be previously marked with ink ; and the cotton or silk being put into the eye of the flat needle, Plate LXVI. fig. 5. and the parts being supported by an assistant, the needle should now be pushed in at one of the spots and carried out at the other, along with two or three inches of the cord, which should be left hanging out. The irritation which the cord excites soon produces a plentiful discharge of matter, which may be increased or diminished at pleasure by covering the cord daily, before it is drawn, with a mild or an irritating ointment.

In former times, it was a frequent practice to form issues by burning the parts in which they were to be introduced with the actual cautery ; and in some parts of Europe it is still continued : But as it is much more terrifying than any of those we have mentioned, and

as it does not appear to be attended with any particular advantage, it is now in general laid aside.

In China, Japan, and some other eastern countries, it is a prevailing practice, in deep seated pains, to burn the parts affected down to the bone with moxa. Moxa is a light, soft down, of a particular plant. A small cone of it being wrapped up, the base of the cone is fixed upon the part with a little glue or mucilage; and fire being put to the opposite end of it, it is allowed to remain till the whole is consumed; and if one application does not prove sufficient, it is repeated once and again as long as it is necessary. The operation may be done equally well with fine flax; but although it has been sometimes done in different parts of Europe, it is not probable that it will ever be generally practised. I have known it, however, remove the most obstinate sciatic pains, where every other remedy had failed,

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## CHAPTER XXXV.

### *Of the Inoculation of the SMALL POX.*

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**T**HERE is ground to imagine, that almost all eruptive diseases, as well as some others, may be communicated by inoculation : the practice, however, is confined to such as are not apt to return ; for no advantage would arise from inducing diseases to which the system might afterwards be liable. The plague has been communicated by inoculation ; but in this country the small pox is the only disease we are accustomed to inoculate. Some trials have indeed been made for inoculating the measles ; but as yet they have not succeeded.

From the result of some experiments, there is reason to think, that no disease can be communicated by inoculating with the blood of an infected person. This point, however, is not as yet precisely determined ; so that farther trials will be necessary to ascertain it. In inoculating the small pox, we employ the matter contained in the pustules which appear on the surface of the body.

The proper period for inoculating—the preparation of the patient—and the subsequent treatment of the disease, are points which more particularly fall to the consideration of the physician. The mode of communicating the infection is our object at present.

In the more early practice of inoculation, it was customary to tie an infected thread round the arm or leg ; to rub a little variolous matter upon any part of the body ; or to insert a piece of thread soaked in matter beneath the cuticle, with a small needle, and to allow it to remain till there was reason to think the in-

fection had taken place. In any of these ways the small pox may be readily communicated : but as by some of these means there is reason to suspect that a variolous atmosphere may be produced, and that the disease may be thus induced in the same way as in the case of a common contagion, and consequently that some of the advantages of inoculation may not be obtained, these modes of giving the small pox have therefore been long laid aside.

Till of late inoculation was commonly performed by making an incision of about half an inch in length through the skin to the depth of the cellular substance : a bit of thread impregnated with variolous matter was then inserted, and retained for two or three days by means of a compress and bandage. To this practice however, the great unnecessary pain attending it, and the aptness of the wound to degenerate into a disagreeable ulcer, are strong objections.

The present mode of inserting the matter appears to be in every respect more eligible. The point of a lancet, previously covered with variolous matter, is insinuated through the cuticle, so as to scratch or slightly injure the cutis vera. It might frequently indeed be sufficient to pass it through the cuticle only ; but success is more certain when a small particle of blood follows the lancet. When the matter is recently taken in an early period of the disease, the lancet may be introduced without being moistened : But whenever the matter has become firm and hard, it should be rendered perfectly soft with a drop of warm water, or by holding it in warm steam.

The operation may be done in any part of the body ; but the arm is generally preferred. One scratch would for the most part prove sufficient ; but with a view to ensure success, it is right to make two or even three at the distance of an inch from each other. It is to be observed, however, that when the matter takes effect in all the scratches, the inflammation which ensues being communicated from one to the other, is  
often

often considerable, and gives much pain and uneasiness. This might be prevented by making the scratches at a still greater distance, or even in distinct parts of the body. One being made upon each leg or thigh would obviate every inconvenience of this kind.

In this method of inoculating we never employ either bandage or compress ; for the wound is so trifling that no kind of dressing is necessary : so that we readily see, at the end of the second or third day, whether or not the infection will take place ; for in general, by this time when the operation is to succeed, the scratches made with the lancet become red, swelled, and somewhat painful.

## CHAPTER XXXVI.

*Of WOUNDS.*

## SECTION I.

*Of Wounds in general.*

**V**ARIOUS definitions have been given of the term wound ; but few if any of them appear to be exact. Boerhaave defines a wound to be, a recent bloody solution of continuity in any soft part, by the motion, pressure, or resistance of some hard or sharp body. By Sauvages, it is said to be a mechanical division of any fleshy part, attended with a separation of the parts newly divided, together with a discharge of blood and a tendency to inflame and suppurate. And Ludwig defines a wound to be a morbid division of parts which in a state of health ought to be united.

These are the definitions of this term which have been most generally adopted ; but it is evident that none of them are sufficiently correct. A part may be deeply cut, even large blood vessels may be divided, without any discharge of blood taking place, as frequently happens in lacerated wounds, and in such as are attended with much contusion ; and where the smaller vessels only are divided, the discharge of blood ceases, almost in every instance, in the course of a few hours from the time that the wound was inflicted.

The definition recited above from Mr. Sauvages, is too extensive : It comprehends a period or stage of wound which does not always exist, viz. a tendency to suppurate.

suppurate. We know that wounds frequently terminate in gangrene and death, without any previous suppuration; while in other instances they heal by the first intention, and their edges adhere to one another without any appearance of pus.

Neither is Dr. Ludwig's definition of a wound correct: Parts which ought to be united, may be divided without being wounded. Thus a blood vessel, nerve, tendon, or muscle, may be completely ruptured either by a violent sprain or a contusion; but unless the corresponding skin and other teguments are divided, we do not say that such parts are wounded. Nor are these affections confined to the smaller muscles and tendons; for instances often occur of the different parts even of the largest muscles being thus violently separated from one another.

Every recent solution of continuity in the softer parts of the body, when attended with a corresponding division of the teguments, may be denominated a wound.

From this definition of wounds, it is evident that they will exhibit great variety in their nature and appearances. This will arise from different causes; but more particularly from the nature of the injured parts; from the manner in which they have been produced; and from their extent.

Thus wounds in fleshy muscular parts are very different, both in their nature and appearances, from such as affect membranous or tendinous parts only. Wounds that are made with a sharp cutting instrument are materially different from such as are attended with much contusion or laceration: and punctured wounds exhibit very different appearances, and for the most part are productive of very different effects, from such as are more free and extensive. In the subsequent parts of this section these varieties in wounds will be considered. In the mean time, we shall give a description of the phenomena which usually take place in the most frequent form of this affection, what

may be termed a Simple Incised Wound ; by which both the theory and practice which we mean to inculcate will be rendered more intelligible.

On the instrument being withdrawn with which a wound of this kind has been made, the first appearance we take notice of is a separation to a certain extent of the divided parts ; and this always in a greater or lesser degree, according to the depth and length of the wound, and according as the fibres of the injured part are divided more or less transversely. Thus a wound, even of a considerable length, if it runs in the same direction with the fibres of a muscle, will be attended with a small retraction of the skin ; while a large vacuity will take place in a wound of less extent where a strong muscular part is cut directly across. Nay, in this last case, the separation of the divided parts is in some cases so considerable, as to give cause to suspect that a portion of them has been removed ; while in the other it is often so trifling, that even an extensive wound will have the appearance of a straight line only : a circumstance by which practitioners have been often led to consider as of no great importance, wounds which in their consequences have proved to be formidable ; and by which the propriety of examining every wound with attention is strongly pointed out.

The next appearance which takes place in wounds, is a discharge of blood to a greater or lesser extent, according to the size of the cut, and to the number and size of the vessels that are divided ; at least this is the case in wounds made with a sharp cutting edge. Where the parts have been much bruised or lacerated, we have already remarked, that even large blood vessels may be divided without any hemorrhagy ensuing.

For the most part, this evacuation of blood from wounds proves so alarming, that means are employed to stop it ; but when this is either neglected or not considered as necessary, if the injured vessels are not large, the irritation produced by the wound itself, as well

well as by the free application of the external air to their divided extremities, excites such a degree of contraction in them, that in this way alone the hemorrhagy is soon checked. The discharge of red blood becomes gradually less : It then ceases entirely, and is succeeded by an oozing of a serous fluid, which in the course of a few hours likewise stops, when the whole surface of the sore is found either somewhat dry or even parched like ; or it is covered over with a cake of coagulated blood.

In this way nature seems to operate in putting a stop to hemorrhagies which arise from wounds. Another idea is commonly entertained indeed of this salutary process : It is supposed that small coagula of blood plug up the orifices of the vessels, and remaining in them preserve them of the same size of which they were before being divided.

This, however, is by no means the case, as will at once appear to any who will take the trouble of dissecting the stump of a patient dying after an amputation. Instead of the mouths of the divided arteries being plugged up with blood, he will find them perfectly empty and contracted for a considerable space from their extremities ; nay, in most instances, he will observe that they become firm solid cords, so as never afterwards to be capable of receiving a supply of blood. Nor is this process of nature difficult to explain. It is arterial hemorrhagies we are now considering ; for wounded veins, if they be not compressed between the injured part and the heart, seldom discharge so much blood as to prove alarming. Now, as the arteries are possessed of a strong contractile power, they will readily exert this power on the irritating causes mentioned above as attendants on wounds, being applied to them. In this manner the blood is prevented from flowing in its usual channel ; but nature does not fail to provide a different route for it, by forcing it through the most contiguous anastomosing arteries, which soon become so much enlarged, as to allow it to pass with freedom ;

while, in the mean time, the contracted state of the wounded extremities of the arteries terminates in a firm adhesion of their sides, in consequence of that inflammation which in some degree succeeds to every wound.

When a wound is made with a clean cutting instrument, the pain attending it at first is in general inconsiderable, unless a nerve or a tendon has been partially divided ; in which case it proves commonly severe. But in every case the wounded parts become painful in the course of a few hours from the time of the injury being inflicted. They become red, tense, and even considerably swelled : And where the wound is extensive, an increased degree of heat takes place, together with thirst, quickness of pulse, and other symptoms of fever.

In some instances these symptoms continue to increase, and to prove more and more severe, till at last they terminate in mortification ; but for the most part they are carried off in a more favourable manner. The surface of the wound, which for some time remained perfectly dry, is gradually rendered moist and soft by a thin serum oozing into it ; which being allowed to collect, is at last, by the heat of the affected parts, and in some cases by the application of artificial heat, converted into purulent matter : and in general, the preceding symptoms of pain, tension, and fever, abate more or less quickly, according as this formation of matter is more or less plentiful. From the time that serum begins first to ooze into the cavity of a wound, the tension and pain begin to abate, and they vanish entirely on a free suppuration taking place ; by which the most natural balsam is produced that can be applied to wounds.

From this history of the progress of a wound, it is evident that all the symptoms we have enumerated, are such as originate from inflammation. Indeed, they are exactly such as accompany a common phlegmon. The pain, redness, and tension, which always  
accompany

accompany wounds to a certain degree, are the leading symptoms in every case of phlegmon; and the serous effusion into the cavities of wounds, with the suppuration which ensues, are circumstances exactly similar to those which occur in every case of abscess. I therefore consider a wound as an exciting cause of inflammation; and some advantage, I think, may be derived in practice, from considering it chiefly in this point of view. This, however, will more clearly appear when we come to speak of the method of cure; when it will be rendered obvious, that in the treatment of wounds, those means prove uniformly most effectual which are most powerful in preventing any violent degree of inflammation.

The description I have given of wounds relates to the most simple and least hazardous kinds of them; where the injury has been done, as was already remarked, with a sharp cutting instrument, and where the parts have been laid freely open. In such circumstances, when no organ of much importance to life has been divided, and when the cut is seated in a fleshy muscular part, if nature be not impeded in her operation, the whole surface of the sore becomes covered with small sprouts or granulations almost immediately on a free suppuration taking place; and these continuing to advance, a cure is at last accomplished in the manner already described in a former part of this work.\*

This happy termination of a wound, however, may be prevented by various causes. Indeed, it requires the concurrence of many circumstances. These we shall afterwards have occasion to treat of in a particular manner. At present I shall enumerate those only which arise from the nature of the wound.

In a free incised wound, the inflammation which takes place is not in general greater than is necessary to produce that degree of suppuration which we have  
shown

\* Vide Treatise on the Theory and Management of Ulcers, &c. Part II. Section II. § 2.

shown to be requisite ; and in wounds of this description, matter is never allowed to lodge, as it is commonly discharged almost as soon as it is formed. These are points of the utmost moment in the management of wounds. Indeed, it is known to every practitioner that a cure can never be expected if a due degree of inflammation does not take place, and if a free outlet be not given to the matter that may form. Every circumstance therefore in the nature of a wound, which tends either to excite an undue degree of inflammation, or to produce a lodgement of matter, must be considered as unfavourable : And hence punctured wounds, and those that are attended with contusion or laceration, are particularly hazardous.

Punctured wounds prove often more dangerous than wounds of greater outward extent, from large blood vessels and other deep seated parts being hurt : and they are commonly more painful, being frequently attended with a partial division of contiguous nerves or tendons ; a circumstance productive of more violent pain than what usually ensues from a free division of them. But the greatest risk in a punctured wound arises from the lodgement of matter ; a circumstance which takes place more readily in this than in any other variety of wound ; and to obviate which, the nicest attention on the part of practitioners is often requisite.

In contused and lacerated wounds, if the violence with which they have been inflicted has not been considerable, the parts will frequently recover their tone ; the attending inflammation will not run to any great length ; and a free suppuration being induced, a cure will at last be accomplished in a manner similar to what we have described in cases of simple incised wounds. But it often happens that the contiguous parts are so much injured as to give no cause to expect such a favourable event. Where a violent degree of contusion has been applied, the texture of the parts affected is sometimes so completely destroyed, that the circulation

tion is stopped, and mortification ensues ; and where this proceeds to any considerable extent, the danger attending it is always great. Again, in wounds attended with much laceration, mortification is apt to occur from a different cause. The pain and irritation attending them proceed sometimes to such a height, as to induce a great degree of inflammation ; which, notwithstanding the means usually employed to prevent it, very frequently terminates in the manner we have mentioned. Indeed, so far as my observation goes, inflammation induced by this cause is more apt to terminate in gangrene than any other inflammatory affection proceeding from external violence.

In forming a prognosis of wounds, the circumstances we have just been considering merit our particular attention : but there are others which should likewise be kept in view ; and these more especially are, the age and habit of body of the patient ; the texture of the wounded part ; the part of the body in which the injury is inflicted ; and the risk of such parts of importance as lie contiguous, being ultimately made to suffer, although not immediately injured.

Thus, it is obvious, that in a sound healthy constitution, wounds will, *cæteris paribus*, be less hazardous than those that are inflicted on people of diseased habits of body ; for we commonly observe, where the constitution is tainted with any disease, that even the slightest wounds are apt to become troublesome, and to degenerate into sores which will not heal till the disease of the system be removed : And we also observe, that the healing of sores depends in some measure upon the age of the patient ; that is, a cure is for the most part more quickly accomplished in youth and in middle age, than in very advanced periods of life.

There are many exceptions, however, to this ; for whenever the natural firmness and elasticity of the muscular fibres are not much impaired, we do not find that old age proves unfavourable to wounds. When the constitution is possessed of such a degree of firmness

ness and irritability, that any wound which takes place will be productive of a necessary degree of inflammation ; old age ought by no means to be considered as a disadvantage. On the contrary, in such circumstances it proves always salutary, by tending to render the symptoms more moderate than they are apt to be in more early periods of life. This is particularly the case in extensive wounds of every kind : and we observe it in a remarkable manner in chirurgical operations ; especially in lithotomy, and in the amputation of any of the extremities ; which have commonly, in the course of my experience, proved more successful in healthy old people than at any other period of life, and evidently from the cause we have endeavoured to point out.

With respect to the texture of a wounded part, it is well known that wounds heal not only more quickly but more kindly in some parts than in others. Thus wounds of the cellular substance heal more easily than such as pass through any of the muscles ; while those that are confined to the fleshy parts of muscles prove much less formidable than wounds of tendinous or ligamentous parts ; for, besides occasioning less pain and inflammation, they are not so apt to be productive of any permanent disadvantage. The deepest cuts may be inflicted on the belly of a large muscle, with little or no risk of any inconveniency being experienced from them in future ; but the contiguous joints are very apt to remain stiff and unmanageable, when the tendons which pass over them are much injured.

When wounds penetrate to a still greater depth, so as to do any material injury to bones, they prove always more tedious and uncertain than when soft parts only are divided : for in such cases a wound will seldom or never heal till some portion of the bone exfoliates ; a process which very commonly requires a considerable length of time to be accomplished.\*

Wounds

\* Vide Treatise on Ulcers, &c. Part II. Section VII.

Wounds in glandular parts are more to be dreaded than the mildness of the symptoms which appear at first would lead us to imagine. When small glands only are divided, they often heal readily; but when any of the larger glands are injured, the system is not only apt to suffer from the secretion for which they are intended being impeded, but the sores which ensue very commonly become fungous, and are cicatrised with difficulty.

When any of the larger lymphatic vessels are wounded, the cure often proves tedious by a constant discharge of a thin limpid fluid, by which the formation of a cicatrix is prevented: And when at last a cure is obtained, very troublesome swellings are apt to occur in the under part of the limb, owing to the obstruction of the lymph in its passage to the heart by the newly formed cicatrix. Of this every practitioner of experience must have seen some instances. I have met with several; particularly after the extirpation of schirrhous glands when deeply seated in the arm-pit. In such cases the large lymphatics of the arm are very frequently cut, and very obstinate œdematous swellings of the whole member are apt to ensue.

When a large nerve is completely divided, the pain attending it will be inconsiderable; but the parts beneath will be deprived both of their sensibility and power of motion, unless they are supplied with some other branches. But when a nerve is only punctured, the pain which takes place is commonly severe: and this is apt to be followed with a high degree of inflammation; smart fever; subfultus tendinum; convulsions; and even death. These violent appearances, however, do not often occur in northern climates; but they frequently happen in warm countries, where they are apt to terminate in a symptom which often proves fatal, the locked jaw.

In wounds of any of the larger blood vessels, our first object is to discover, whether the hemorrhagy  
which

which ensues proceeds from arteries or veins ; for in general no material inconvenience is experienced from wounds even of the largest veins, while the utmost danger is to be dreaded from wounds of the larger arteries. If the artery be so situated that a ligature cannot be put round it, the loss of blood will probably soon prove fatal : and even where the discharge of blood can be stopped with ease, if the limb has no other artery to supply it, a mortification is to be dreaded. It often happens, indeed, even that large arteries are secured by ligatures without any detriment to the parts beneath : But in this case there are other arteries or anastomosing branches of such a size as to give passage to a sufficient quantity of blood.

The site of a wound is also an object of importance. Thus wounds in the extremities, when confined to parts lying above any of the hard bones, are not to be considered as so hazardous as those which pass into any of the joints : and in other parts of the body, wounds which penetrate any of the larger cavities, prove always more dangerous than those which do not run to such a depth.

This will proceed from different causes. The danger will be increased by the chance of some organ of importance being directly injured : By air, and in some cases by extraneous bodies, finding access to cavities which nature never meant to be exposed : And lastly, by the lodgement of matter ; a circumstance which is with much difficulty avoided in all wounds which penetrate to such a depth.

We have likewise to consider, that although no organ of importance may be directly wounded in such a manner as to produce immediate death ; yet that much danger may arise from a variety of circumstances ; and wounds may eventually prove mortal which at first were not attended with any evident risk.

Thus wounds in the lungs, and other viscera, prove sometimes fatal, from continuing to discharge such quantities of blood for a considerable time as at last destroy

destroy the patient ; although at first the discharge might not appear to be of much importance. The stomach, and different parts of the alimentary canal, may be injured in such a manner as to terminate in death without exhibiting any immediate appearance of danger. The external coat of the aorta has been removed by the point of a small sword ; and the wound has been nearly healed when the patient died suddenly from a rupture of the artery : And wounds of the gall bladder, or of its excretory duct ; of the receptaculum chyli ; of the thoracic duct, and some other viscera ; may for several days afford no suspicion of danger, and yet terminate fatally at last.

Wounds sometimes prove fatal from inflammation spreading to contiguous viscera which were not at first injured ; and wounds, which have at first appeared to be of little or no importance, have at last terminated in the worst manner, merely by mismanagement ; either in the application of dressings or bandages ; or in the conduct of the patient with respect to food, drink, and exercise : for it is well known, that much mischief has been done by improper dressings, and especially by too light bandages : and we likewise know, that misconduct with respect to food is daily the cause of wounds going wrong, which otherwise would probably have done well.

It thus appears, that a variety of circumstances fall to be considered, to enable us to judge of the probable termination of wounds. In doing this with accuracy, practitioners of experience have frequent opportunities of showing their superiority. This subject ought therefore to be considered as highly important by all who wish to distinguish themselves. A minute knowledge of anatomy, a cool temper, and a steady hand, will enable any practitioner, even with no great experience, to perform many of our most important operations sufficiently well : And accordingly, in different hospitals, we daily meet with good operators ; but we do not often find surgeons possessed of that knowledge  
in

in the prognosis of chyrurgical diseases which might be expected ; that attention being seldom bestowed which is necessary to attain it.

## S E C T I O N II.

### *Of the Cure of Simple Incised Wounds.*

**I**N the management of wounds of every kind, the first object requiring our attention is the hemorrhagy ; more especially when it is profuse. The safety of the patient requires it : The alarm which it gives, not only to bystanders, but to the practitioner himself, renders it necessary. Nor can the real state of a wound be discovered with accuracy till the discharge of blood be checked.

Hemorrhagies are most immediately stopped by pressure applied to that part of the divided artery which is next to the heart : This pressure is made by the tourniquet, when the wound is in any of the extremities ;\* and by the hands of assistants, in wounds of the trunk of the body or of the head.

In this manner, if the pressure be properly applied, almost any hemorrhagy may be stopped till the wounded vessels can be secured with ligatures ; which we have elsewhere shown to be the safest as it is the easiest method of preventing patients with such injuries from suffering.\* Much indeed has been said, even of late years, of the inconveniences which ligatures are supposed to induce : but this has proceeded either from the interested views of some individuals who may have wished to establish the reputation of different styptic applications ; or from the groundless fears of young practitioners. Where the contiguous nerves, or even where much of the surrounding muscular parts, are included in ligatures, severe pain, and other troublesome symptoms, will no doubt be induced ; but this is not  
the

\* Vide Vol. I. Chapter II.

the fault of the remedy, but of the method of using it. Indeed this is so obviously the case, that reasoning in the farther support of it does not seem to be necessary; for every practitioner of experience will admit that a proper application of the ligature is seldom if ever productive of any material inconvenience, and that we can depend on it with more certainty than on any other remedy for putting a stop to hemorrhagies from wounded arteries.

When treating of the method of applying ligatures to arteries, in the first volume of this work, I gave it clearly as my opinion, that it may be best done by the *tenaculum*, an instrument represented in Plate I. fig. 1. And after much additional experience of its utility, I now think it right to say, that I am more and more convinced of its being much superior to the needle; which cannot be used without a portion of the contiguous soft parts being included in the ligature; a circumstance which in every instance we should endeavour to avoid. Many imagine that the *tenaculum* may be used with safety in the application of ligatures to arteries of a middling size, while they are afraid of cutting those of a small size asunder, if some of the contiguous cellular substance be not included along with them: and in tying the large trunks of arteries, they suspect that the ligatures would be apt to be forced off by the strong pulsations of these vessels, if they were not supported by being firmly fixed in the contiguous parts. I have not, however, had a single instance of observing that either of these objections to this practice is well founded. For a number of years past, I have laid aside the needle, for the purpose of applying ligatures to arteries, almost entirely; and in the course of that time, I have employed the *tenaculum* indiscriminately in hemorrhagies from arteries of all sizes.

Wounded arteries are seldom so situated as to prevent the hemorrhagy from being stopped in the manner we have mentioned: for when they lie at the bottom of deep wounds, with narrow contracted mouths, the

the wound may commonly be enlarged so as to admit of their being tied with ligatures ; and for the most part it may be done with safety. Where the enlargement of a wound is not clearly necessary, no person of experience would advise it ; but the practice is always safe and proper in hemorrhagies proceeding from arteries lying so deep that ligatures cannot otherwise be applied to them. As this practice, however, has been very inadvertently condemned by some practitioners in a general way, from their supposing it to be rarely if ever necessary ; a timidity has been thereby introduced, which in various instances has been the cause of mischief : Patients have been tormented with the application of tight bandages, and with the trial of different styptics which seldom if ever succeed, when the hemorrhagy might have been stopped in the most effectual manner by a small enlargement of the wound : Nay, many limbs have been amputated from the same cause, which might easily have been saved ; particularly in cases of compound fracture, where a hemorrhagy, proceeding from a deep seated artery which cannot be easily tied, is too frequently considered as a sufficient reason for removing the limb. From particular circumstances, in a few cases of compound fracture, it may happen that hemorrhagies cannot be stopped without laying the injured parts so extensively open, as might induce more hazard than amputation itself. This, however, is a very rare occurrence ; and it will seldom take place where the case has been properly treated from the beginning.

When the injured artery runs in the substance of a bone, no ligature, it is evident, can be applied to it ; and, therefore, in such a case, enlarging the wound could not be attended with much advantage. But arteries in this situation are never so large as to lead us to be much afraid of any hemorrhagies that may proceed from them ; nor does it often happen that they continue to bleed long after they have been completely divided. An artery thus situated, being merely wounded,

wounded, may discharge a great deal of blood; but I have met with different instances of the hemorrhagy stopping almost immediately on the vessel being cut across. Authors indeed have said, that the utmost danger has been induced by arteries surrounded with bone being wounded; nay, that death itself has happened from this cause, owing to the impossibility of including them in ligatures. I am convinced, however, that it is a partial division only of such arteries that will ever produce hemorrhagies of any importance; for they are always small, and they never adhere so firmly to the surrounding bone as to be prevented from contracting on being freely divided.

Where the discharge of blood proceeds from large vessels, the means we have mentioned are the most effectual for putting a stop to it. But when it occurs from an infinite number of small arteries over the whole surface of the wound, other remedies must be employed. We must refer, however, to a former chapter of this work, where this subject was more fully considered.\*

The hemorrhagy being stopped, the next object requiring our attention is the removal of any extraneous body that may have been admitted: and where such substances are not deeply seated, this is always done both with most ease and safety with the fingers alone; for when forceps and other instruments are employed, we can scarcely fail to injure the contiguous parts.

The examination of wounds, with a view to discover extraneous bodies, ought to be made with much caution and delicacy; for, handling the parts roughly, gives unnecessary pain, and is apt to induce a degree of inflammation, which often proves hazardous.

But although it is always proper to accomplish the removal of extraneous bodies with as little pain to the patient as possible; yet wherever we have any certainty of bodies of this kind being lodged, we ought by all means to proceed with firmness, in the first place, in  
discovering

\* Vide Vol. I. Chap. II. Section II.

discovering their situation, and afterwards in removing them, excepting in a few particular cases where this cannot be done without much risk of injuring parts of real importance to life. In such cases the judgment of the practitioner must decide between the danger that may probably ensue from the extraneous body being allowed to remain, and that which may arise from his proceeding to remove it immediately.

Modern authors in general strictly forbid much assiduity in the removal of bodies of this kind: for they very properly observe, that in former times much mischief was done by exploring wounds with more exactness than was requisite; by which unnecessary pain was induced, and cures rendered more tedious than they otherwise would have been.

But in this matter the moderns seem to have gone from one extreme to another: for although much handling of sores, and a free use of probes, forceps, and other instruments, are seldom necessary, it is equally true, that by allowing extraneous bodies, which might have been removed at first, to remain in wounds, much future pain and inflammation have been occasioned.

In support of the practice we are told, that various cases are on record of extraneous bodies continuing to lodge in different parts of the body without any inconvenience; that this will commonly happen when the substance is not of a stimulating nature; and when it is of such a form or texture as to induce pain, that it will soon excite such a plentiful suppuration as will quickly throw it out in a much more easy manner than if it had been removed at first. In answer to this, I shall observe, that where extraneous bodies in wounds cannot be removed without giving the patient a great deal of pain; and especially where there is any risk of large contiguous blood vessels being wounded by it; we ought by no means to attempt their removal. In such cases we ought certainly to trust to the subsequent suppuration for throwing them out: But they ought  
always

always to be taken out immediately when it can be done with tolerable ease, or without injuring any parts of importance. In this way a more expeditious cure is obtained, and we accomplish our purpose in an easier manner, than could be done in any future stage of the fore. For in a recent wound, while no inflammation or tension takes place, the contiguous parts easily stretch and yield to the extraction of any substance that may be lodged in them, if it be not of an angular form, and if the operation, instead of being performed quickly, be done with slowness and caution: whereas, when the contiguous parts become stiff and painful, which they always do in the course of a short time, any substance lodged in them is removed with much pain and difficulty: for even after a free suppuration has taken place, although the parts will be considerably relaxed, yet still they will be more stiff and tense than they were at first; and the opening through which the substance is to be extracted will likewise be much diminished.

We gain another very material advantage by the immediate removal of extraneous bodies from wounds. While a fore is recent, almost every patient will allow every thing to be done which the practitioner in attendance may think necessary; but they frequently refuse, in future stages of the fore, to submit to any thing besides the usual dressings.

It may be remarked in this place, that of the extraneous bodies that are apt to be lodged in wounds, some are more harmless than others. A prudent practitioner will therefore be more or less anxious in attempting to remove them. Thus we all know, that a lead ball may be lodged very deeply, for a great length of time, without being productive either of pain or inconvenience; while a splinter of wood, glass, or iron, or even a bit of cloth, will often create a great degree of uneasiness. When therefore, it is known that a lead ball is the only substance that is lodged, if it cannot be easily removed, we have at least the satisfaction of being

assured that it will not probably do much harm. We will therefore allow it to remain, either till it be loosened by a plentiful suppuration, or till some future period, when it may perhaps be discovered in a different situation, so as to be taken out with safety at a counter opening: While, on the other hand, when such substances are lodged in wounds as will probably excite much irritation and pain, it will be much for the interest of the patient, and will be the means of preventing much perplexity and trouble to the surgeon, to have them removed as soon as possible after the injury is inflicted.

We have observed above, that in removing extraneous bodies from wounds, it should be done with the fingers alone, rather than with forceps. Some few exceptions may occur to this, which we shall afterwards have occasion to mention. But substances are sometimes lodged in wounds that cannot be easily taken out either with the fingers or forceps. This is particularly the case with sand, dust, and small pieces of glass. These are best removed by bathing the parts in warm water, or by pouring water upon them; squeezing it gently from a sponge, or injecting it slowly with a syringe.

In performing even this very simple operation of washing a wound, as well as in extracting foreign substances either with the forceps or in any other way, it is proper to observe, that much advantage may be derived from placing the patient in such a posture as tends most effectually to relax the injured parts, so as to obtain as wide a separation as possible of the lips of the wound. I have seen different instances where, from want of attention to this circumstance, patients have suffered much unnecessary pain; where, after various trials, the practitioner has been obliged to desist without accomplishing his object; and where another practitioner has proved at once successful, merely by putting the wounded parts in a relaxed position.

After

After paying due attention to the circumstances respecting extraneous bodies lodged in wounds, our next object is the conduct of the cure.

In incised wounds, a separation of the parts that have been divided takes place; and as every wound proves a cause of irritation, the separation which at first appears, continues for some time to increase, merely by the contractile power of the injured muscles. In the usual way of covering wounds with lint, or with pledgits of ointments, and where the parts have not been previously drawn together and retained in their situation, an effusion of a serous fluid soon takes place from the great number of small vessels that have been cut. This is afterwards converted into purulent matter: in a short time the sore is found to be covered with an infinite number of small sprouts or granulations; and these having advanced to a certain extent, a dry pellicle of scarf skin, termed a *Cicatrix*, forms over the whole extent of the wound, and thus the cure is completed.

This is the manner in which the healing of wounds is effected, when nature is not assisted by art, or when her operations are only promoted by proper coverings, and protection being given to such parts as are injured. But although, in some cases, this is our only resource; and although even in this way practitioners have it always in their power to forward the cure of sores; yet it is liable to many very important objections, which may be obviated by a different treatment.

When a wound is healed in this manner, if the parts which have been divided have separated to any considerable extent, the suppuration which ensues will be plentiful; by which, if the constitution is weak, the patient is apt to be materially injured. In extensive sores, this method of cure is always tedious: When deep muscular parts are injured, the motion of the contiguous joints is apt to be affected, by the divided parts healing when too far separated from each other.

And the cicatrix of a large wound, when cured in this manner, is always stiff, unseemly, and disagreeable : nor is it possessed of that strength and firmness which the parts beneath require for their protection.

Patients, however, are seldom under the disagreeable necessity of submitting to these inconveniences : for in general, wounds may be cured in a much more easy as well as in a more agreeable manner. We know from experience, that two inflamed surfaces of an animal body, when kept in contact, will soon adhere together. This was probably at first pointed out by accident ; but practitioners now derive much advantage from it in various operations, as well as in the treatment of accidental wounds. By drawing such parts as have been divided into contact with each other ; and especially by taking care to have them all as completely covered as possible with the cutis vera, very extensive wounds are often quickly cured ; the power of moving and of using limbs with freedom is often preserved which otherwise would be lost ; the scar or mark which remains is seldom of any importance ; and the wounded parts have the advantage of being sufficiently protected.

The fact has been long known with respect to this point ; for there is nothing more certain, than that parts recently divided, will unite firmly together, if they be kept in contact for a sufficient length of time. The cause, however, of this phenomenon has not hitherto been rendered clear. The prevailing idea is, that it proceeds from a direct inosculation or junction of the different parts that have been divided ; and that those parts only will adhere together which were formerly united. Thus it is imagined in the healing of wounds in this manner, that a divided artery on one side of a cut must be made to adhere directly with its fellow on the opposite side ; that veins must unite with veins ; muscular fibres with fibres of a similar nature, &c. But although it is necessary in practice to keep this idea so far in view, as to place parts that are to be  
healed

healed as exactly opposite to each other as possible ; yet this proceeds more from a requisite attention to symmetry and neatness in the external parts after the cure, than from any other cause : for it is certain, that no such exactness is required for the mere adhesion of the divided parts ; and whoever doubts of the fact, may with little difficulty prove it experimentally. A membrane may be made to adhere to a bone ; and the divided end of an artery or a vein will unite with almost any substance with which it is kept in contact.

It is indeed true, that blood circulates through the cicatrix of a wound ; a fact which few will doubt, and which probably gave rise to the opinion we are now considering. But we have reason to believe that this circulation does not take place immediately on the formation of a cicatrix. It seems rather to be an after process of nature, and is evidently accomplished by an infinite number of small vascular sprouts or newly created blood vessels, which proceed from the larger arteries and veins on each side of the wound, and inosculate with each other so as to give a sufficient circulation in the parts through which they pass. At least I have found, in different instances, on examining the cicatrix of a large wound, that it was always very vascular ; and I conclude that it happens from a new formation of small blood vessels, as the divided extremity of every blood vessel, whether artery or vein, when of such a size as to be easily distinguished, is always shut, and even obliterated for a certain space, from the point where the injury happened, in the same manner as in arteries that are tied with ligatures, in cases of amputation and other capital operations. And if this happens in vessels of a large size, there is reason to suppose that it does so in those that are smaller.

In confirmation of this opinion, we may observe, that a circulation of blood betwixt adhering surfaces takes place where inosculation of the kind in question can never occur, from no previous division of blood vessels having been made. Thus when the skin of two

contiguous fingers or toes becomes raw or tender, without any blood vessels being injured, it is difficult to prevent them from adhering ; and when they do adhere, a free circulation is afterwards found to take place between them. Other instances might be adduced ; but I notice this one, as it is not unfrequent, and as it is perfectly applicable to the present question.

I therefore conclude, that wounds cured in this way are healed in the same manner as adhesion is produced between inflamed surfaces, namely, by exudation of the glutinous part of the blood from the extremities of the divided vessels ; which in the first place retains the parts together, and afterwards serves to support the new formation of small blood vessels which nature puts forth as a farther and more certain means of retention.

I have entered into this physiological discussion, imagining that it tends to establish a material point in practice. It has commonly been supposed, that the space of twelve, fourteen, or fifteen days, is necessary for the complete adhesion of divided parts : a supposition which proceeds upon the idea that this adhesion is formed solely by the inosculation of blood vessels. But if a glutination alone is necessary, in the first instance, to accomplish this adhesion, it is evident that it must be effected sooner. Accordingly I have uniformly found divided parts adhering firmly about the fifth day ; and have known the bandages accidentally removed from wounds on the second and third days, without any separation of the parts newly united being the consequence. From this it appears, that a shorter application of the usual means of retention will answer than is commonly practised. Surgeons term this treatment of sores, *Healing by the First Intention* ; and as it is in every respect the most desirable method of cure, it should always be followed when practicable.

In

In other varieties of wounds, different reasons often occur to prevent us from curing them in this manner. These we shall afterwards have occasion to mention. But in the simple incised wound, where the injury has been inflicted with a clean cutting instrument, without producing puncture, laceration, or contusion, the only objection that can occur to it, is our not being able to draw the divided parts into contact, and to retain them in that situation till they adhere together. This, however, will seldom happen, unless a loss of substance takes place to a considerable degree. Where a large portion of skin, with the muscles beneath, has been entirely cut out, it may in some cases be impossible to bring the retracted edges of the wound together; but we may always make them approach so as to diminish the size of the sore, and may thus have it in our power in every instance to forward the cure. In deep transverse wounds, even where no substance is lost, the retraction is often so great, as to render this practice somewhat difficult: But by placing the injured part in that situation which tends most effectually to relax the divided muscles, we may effect our purpose almost in every instance. It is indeed surprising to see how completely divided parts will be made to approach, which, while the muscles were upon the stretch, were separated to a considerable distance from each other. We should not therefore despair too soon; for even in the worst cases we seldom fail by due perseverance to produce some very essential advantage.

When it is found that the divided parts may be drawn together, we have next to fix upon the best and easiest method of retaining them in this situation during the cure. There are various means proposed for this; namely, bandages of different kinds, adhesive plasters, and sutures.

The sides of wounds of a longitudinal direction, situated in any of the extremities, and of some wounds of the head, may be retained by the uniting bandage. But it seldom answers in the trunk of the body; nor can

can it ever prove useful in wounds, either in the legs or arms, of a transverse direction : And even where there is reason to imagine that it will answer sufficiently well for retaining the sides of the wound in contact ; yet we ought never to trust to it entirely ; for we cannot depend upon it with any certainty for preserving the skin smooth and equal : a circumstance of much importance in the cure.

The easiest method of retaining the skin exactly in its situation, is by means of adhesive plasters, applied in the manner represented in Plate LXVII. In some cases plasters alone will prove sufficient ; but when much retraction is expected, the uniting bandage should be applied over them whenever the direction of the wound renders it admissible.

Many practitioners, in every instance of wound, prefer adhesive plasters to the use of sutures ; but it is in particular cases only that this preference is proper. Adhesive plasters may be used with advantage in superficial wounds that do not penetrate much deeper than the cellular membrane : and where there is such a loss of substance as prevents the sides of a wound from being drawn close together, they may be employed for the purpose of retaining the retracted parts as near to each other as they can be easily brought. But in all wounds that penetrate to any considerable depth, and when their edges can be drawn into contact, the twisted suture is by much the most effectual means of retaining them. For a description of this and other sutures, we must refer to Vol. I. Chap. I. The common interrupted suture is indeed more frequently employed than the other ; but it does not support the parts with such certainty : the ligatures are more apt to tear or cut out the parts which they surround ; and they frequently leave disagreeable marks.

On this subject it is the common opinion, that adhesive plasters and sutures are admissible only in the recent state of wounds. But however desirable it may be, for various reasons, to have the application of either

FIG. 1.

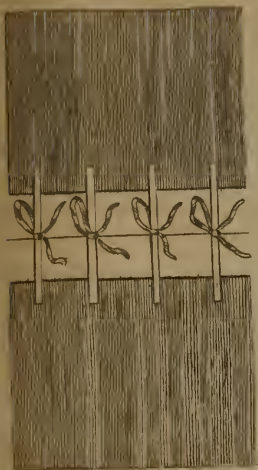


FIG. 2.

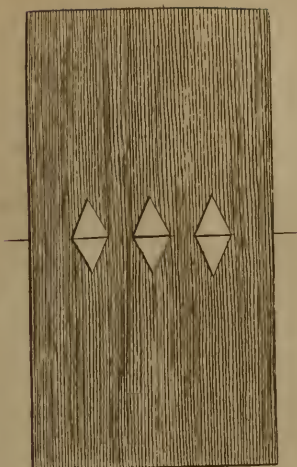


FIG. 3.

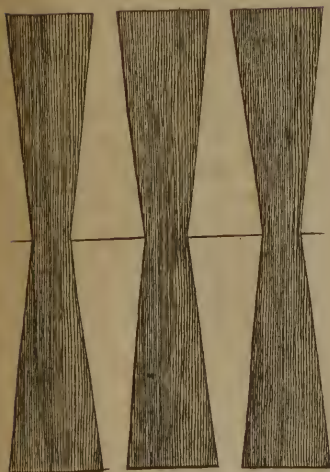
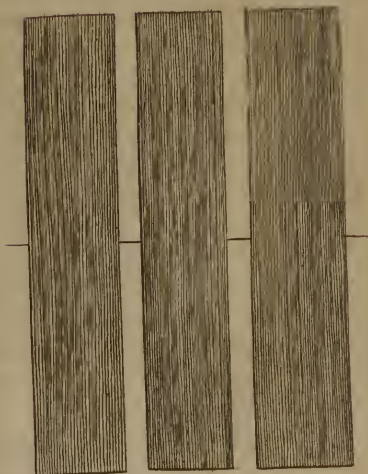


FIG. 4.





ther made as early as possible ; yet where they have been neglected at first, they may be employed with advantage during any stage of the sore : for we are wrong in supposing, as is commonly done, that wounded parts will not adhere when in a state of purulency. I have repeatedly treated, in this manner, sores of two, three, and four weeks duration, and always with advantage : Insomuch, that I believe the practice will very commonly succeed in every stage of a sore when the retracted edges can be brought together.

Whether we employ adhesive plasters or futures, we should be very attentive in supporting the parts, as far as it can be done, by the posture of the patient ; for if this be neglected, futures of every kind will yield so as not to answer the purpose : And along with this, when plasters are used, a farther advantage, as we have already observed, may be derived from a proper application of the uniting bandage ; but for the reasons given in the chapter on Sutures, and again when treating of the Hare Lip, in Chap. XXIX. neither this nor any other bandage can with propriety be employed with the twisted future.

When a wound is treated in this manner, as soon as the retracted edges are drawn together and properly supported, whether by plasters or futures, no other dressings are necessary, excepting some thin covering of soft lint to protect the parts beneath from cold ; and with a view to prevent as much as possible any access to air, the lint should be spread either with some unctuous substance, or with mucilage of any inoffensive gum.

This being done, the patient should be enjoined to preserve the injured parts in the posture that is judged most favourable ; and care should be taken to put him under proper regulations with respect to diet. If he is low and emaciated, he may with propriety have a small allowance of light nourishing food ; but if he is in any degree plethoric, or liable to inflammatory affections, if the wound is of any considerable extent, a  
strict

strict antiphlogistic course will be absolutely necessary ; for although inflammation to a certain extent be highly necessary for the cure of the wound ; yet a prudent practitioner will always guard against excess of inflammation, as productive of much mischief.

In open wounds, one of the most effectual applications for removing extreme degrees of inflammation, is warm emollient cataplasms ; but as they tend to induce the formation of matter, and as this would be directly opposite to our views in adopting the mode of cure we are now considering, it is evident in such circumstances that they are altogether unapplicable. But although warm emollients cannot with propriety be employed ; yet much advantage may be derived from a prudent use of any cold emollient oil or unguent. When the attending symptoms of pain and inflammation continue moderate, the dressings should never be removed till the cure be completed ; but whenever the pain becomes severe, as it would probably, if neglected, terminate in a considerable degree of inflammation, by which our intention might be frustrated, the dressings should be immediately taken away, so as to admit of the pained parts being freely rubbed or even bathed with an emollient. By repeated applications of this kind, I have seen different instances of very distressing degrees of pain being much alleviated, and of the contiguous parts being so much relaxed, as to admit of the cure by adhesion going on without interruption. In some cases, however, we are under the necessity of employing other means ; and of these the most effectual are opiates and blood letting, particularly local blood letting by means of leeches ; which often proves effectual in removing pain and inflammation, when every other application has been tried in vain.

In general, a continuation of these means will answer the purpose : but it sometimes happens, that notwithstanding all our endeavours, the pain and inflammation increase, and the tension of the wounded parts becoming

becoming more considerable, the plasters or ligatures with which they have been kept together must be taken away, otherwise they will do mischief; and at last will yield, so as to be productive of no advantage whatever. In such circumstances it is better to remove them at once; and for the most part this will give the patient immediate relief: the pain and tension will soon disappear; and a cure will be accomplished in the ordinary way: for it might prove hazardous to attempt the same method of treatment again.

By these means the bad consequences now mentioned may be obviated: But it is proper to remark, that symptoms of this kind are not frequent. In general, the cure goes on without interruption; and where this is the case, our views are completed as soon as there is reason to suppose that a firm adhesion has taken place between the edges of the wound. We have already remarked, that this process is commonly effected in a shorter time than is usually imagined. In superficial wounds, the ligatures, or other means of retention, may be removed sooner; but even in deep extensive wounds, when the habit of body is sound, they may with safety be taken away on the fifth or sixth day: for by this time all the advantage that can be derived from them will be gained; while much inconvenience, and some mischief, may arise from their being allowed to remain longer.

We have already mentioned many of the advantages which result from this method of curing wounds. Indeed they are so great, that there should be no hesitation in attempting it almost in every instance: for even when it fails, we are certain that any troublesome symptom that may be induced by it, will be removed by due attention to the means we have mentioned; while much time will be gained when it succeeds. Two objections are commonly made to this mode of treatment, which we shall shortly mention. It is said that the ligatures with which it is often necessary to secure the arteries, will act as extraneous bodies, and prevent

prevent the sides of the wound from uniting. And it is likewise observed, that in the course of the cure, matter is apt to form; from the lodging of which, troublesome sinuses are produced. Neither of these objections, however, is in any degree well founded; at least, I have never met with a single instance of either of them. It seldom happens that more than one or two arteries in any wound are so large as to require to be tied: but I know from experience, that wounds may be cured by drawing their edges together, even where a considerable number of arteries have been secured by ligatures: for the threads occupy very little space; and when they are applied with the tenaculum, which ought always to be done, they are easily removed without any disturbance being given to the other parts of the wound. And again, with respect to sinuses being apt to form from this method of treatment, if the edges of a wound be only drawn together above, a cavity will thus be formed beneath, where matter will no doubt be apt to lodge; but this should not be attributed to the method of cure, but to the mode of putting it in practice: for in every wound which ought to be treated in this manner, the whole of the sides or edges may be drawn together from top to bottom; and by this means the formation of sinuses prevented.

- We have now to speak of those wounds which do not admit of this mode of treatment. When the edges of a cut cannot be drawn together, after the hemorrhagy is stopped, and extraneous bodies removed, we find by experience, that the most effectual assistance we can afford, is to promote as much as possible the formation of matter: for the fact is undoubted, in every wound of this kind, that a free suppuration proves the most effectual relief to every symptom; at the same time that it appears to be so materially connected with the cure, that the healing process never begins till the sore is covered with good pus; a circumstance by no means difficult to account for. The cure of  
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fores healed in this manner, is so far effected by nature alone, that although some advantage may be derived from art, yet the chief object of practitioners is to remove such impediments as might tend to obstruct the operations of nature, and to protect the injured parts till the cicatrix becomes sufficiently firm. Now, as we know that a sore will never be covered with granulations, or be cicatrised, as long as it is very painful; and as nothing with which we are acquainted proves so mild an application to wounds as pus, we may conclude, that it is chiefly useful by preserving the injured parts in that easy, pleasant state, which seems to be indispensably necessary for the cure of every sore. It should therefore be our first object, in treating sores in this manner, to forward the formation of pus as quickly as possible; and the most effectual method of doing it is, by treating every wound in the same manner as we do a common phlegmon; namely, by a free use of warm emollient poultices and fomentations. In the first place, the parts ought to be immediately covered as completely as possible, so that they may be protected effectually from the admission of air. When the pain which occurs is excessive, poultices may be directly applied, as being the surest means of relieving it: but, when the pain is moderate, it is better to delay the use of emollients for a day or two; for as pus cannot be produced till a serous effusion has first taken place, and as we know that some degree of inflammation is required for effecting this, when the pain and tension in wounds are inconsiderable, an immediate application of poultices is apt to do harm, either by preventing altogether, or by retarding and rendering too languid that inflammatory affection which is so highly necessary for the cure. But in every instance of wounds of any considerable extent, remedies of this kind prove always useful after the first two or three days have elapsed: for by this time a sufficient degree of inflammation has commonly taken place for effecting the wished for effusion;

fusion ; and we have elsewhere had various opportunities of showing, that in no way whatever can this be so readily converted into purulent matter as by a free application of heat ; so that whenever this remedy is judged to be proper, it should be used to the same extent as we commonly find to be necessary in every case of abscess.

It is proper, however, to remark, that some caution is required in the use of this remedy : for although heat, whether conveyed by means of poultices or fomentations, is perhaps the most useful application in the stage of wound we are now considering ; yet a long continuance of it is very apt to do mischief, as we have daily opportunities of observing where it is employed by those who do not consider upon what principles it acts in proving serviceable. When the purpose we have mentioned is gained, namely, a free and kindly suppuration, as it is for this only that poultices are used, they should now be laid aside : for when continued longer, they almost constantly do harm, by relaxing the parts to which they are applied too much ; by which they are apt to become pale, soft, and spongy, instead of being of a healthy red colour, and of a considerable degree of firmness. Nay, they are at last often productive of the very contrary effect for which they are employed : for although much inflammation proves always hurtful in the cure of wounds, yet in some degree it is in every case necessary. Now, by continuing the use of warm emollients too long, this salutary degree of inflammation is so entirely carried off, that the matter becomes thin and in too great quantities. And thus troublesome vitiated sores are produced, which a different management might have prevented. The period at which the use of poultices and other warm applications should be laid aside, must be determined in every case by the judgement of the practitioner ; but this general rule may be safely adopted, That they may at all times be persisted in as long as much pain and inflammation continue ; but  
these

thēse symptoms becoming moderate, the discharge being good, and the surface of the wound covered with granulations of a healthy appearance, they should now be laid aside. In this state of a sore, all the advantages are gained which poultices can produce; and a longer continuance of them might occasion some of the inconveniences we have mentioned.

With respect to the most proper dressings for wounds, as we have considered this subject elsewhere,\* it will not be necessary to treat of it at present with that minuteness which otherwise would have been proper.

We have already had different opportunities of remarking, that a certain degree of inflammation is necessary in the cure of every sore; but as this very rarely proves deficient, and as there is more to be dreaded from its proceeding too far, especially in the first stages of large wounds, the mildest dressings only should be employed. During the progress of the cure, much advantage indeed may sometimes be derived from the application of dressings of an irritating, or even of an escharotic nature. This, however, is only the case when a wound has advanced to the state of an ulcer. While a wound is yet recent, there cannot be a doubt of the mildest applications being the best. In this country, soft dry lint is commonly employed, and by some, pieces of soft sponge are recommended; and it must be admitted, that they answer much better than any of the irritating balsams which till of late were so universally used, and which in most parts of Europe are still continued: for it was in Britain that mild dressings to wounds were first introduced; and it is in this country only where even yet they have been generally received. But although dry lint is an easy mild application when compared with many others, yet it is certain that it always creates some degree of pain and irritation on being first applied; and it is apt to adhere to the edges of a wound, so as to cause some pain  
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\* Treatise on Ulcers, &c. Part II.

and difficulty on being removed. With a view to prevent these inconveniences, it should be thinly spread with some mild emollient ointment ; such as Goulard's cerate, or the Unguentum Simplex of the Edinburgh Dispensatory. By this means it gives no pain in the application, and it is removed with ease, at the same time that it serves more effectually than dry materials to prevent the air from finding access to the fore. As dry lint, however, has long been very generally employed in this country, any innovation will not be readily admitted ; but what I have advised being the result of a good deal of experience, I can with confidence recommend it.

A piece of soft lint, spread with any ointment of this kind, being laid over the wound, a bolster of fine tow should be applied above it for the purpose of keeping the parts warm, as well as for absorbing any matter that may be discharged ; and this being covered with a compress of old soft linen, the whole should be retained by a bandage of fine flannel, which is preferable to linen, in so far as it is more agreeable to the feelings of the patient, and as it yields to any accidental swelling or tumefaction of the neighbouring parts : whereas linen, possessing little or no elasticity, is very apt to do mischief, by remaining stiff and immoveable, notwithstanding any swelling that may ensue.

Practitioners are not agreed respecting the time at which the first dressings of sores should be removed ; and nothing decisive can be said on the subject, as in some measure it must be directed by the circumstances of every case. This general rule, however, may be properly adopted, that a sore should always be dressed when it is found to be plentifully covered with matter. This will generally be the case about the fourth or fifth day ; but as the formation of pus depends upon different circumstances, particularly upon the health of the patient, and upon the degree of heat in which the parts have been kept, some latitude must be allowed in this matter. A free use of poultices, after the  
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second day, puts it in our power to remove the dressings much sooner than we otherwise could do : for they not only promote the formation of matter, but they soften all the coverings that have been used, so as to admit of their being easily taken away.

When the cure of a wound goes on without interruption, the second, as well as all the subsequent dressings, should be precisely the same as the first : for our object being still the same, no variation, it is evident, can be necessary. As nothing proves more hurtful to sores than exposure to the air, one great object in our application of dressings is to prevent any inconvenience which might arise from this. And the same reason renders it necessary to change the dressings as seldom as is consistent with cleanliness ; and to be as expeditious as possible in the renewal of them. In general, however, no harm will occur from a daily dressing of wounds. They should not, but in very particular circumstances, be dressed more frequently ; nor can it often be proper to dress them seldomer than this : for when matter is allowed to lodge for a longer time, the heat in which patients with large wounds are usually kept, is apt to make it become putrid and offensive. But as I have elsewhere had occasion to speak fully upon this subject, it is not now necessary to enter upon a more particular consideration of it.\* I shall just observe farther, with respect to the continuance of mild dressings to wounds, that it ought to be regulated by the progress of the cure. As long as it continues to advance, they should be persisted in ; but when the sore assumes appearances in any degree morbid, some variety in the dressings will be highly proper ; and the nature of any change that is to take place must be regulated by the particular situation of the affected parts. We must refer, however, for a more minute consideration of this part of our subject to the different sections in the *Treatise on Ulcers* alluded to above.

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\* Vide *Treatise on Ulcers*, &c.

We have hitherto been supposing that none of the symptoms which take place are violent ; in which case the cure of every wound will, for the most part, go easily on under the mode of management we have mentioned. But in some cases the cure is not only much interrupted, but even much hazard is induced by the unusual height to which some of the symptoms proceed ; and these particularly are, pain, inflammation, and convulsive affections of different kinds. We shall therefore offer a few observations upon the means of obviating these symptoms, when they proceed to such a height as to prove any interruption to the cure.

A wound cannot be inflicted without inducing pain : for even the slightest injury which can be done to any part of the body, must necessarily affect some of the smaller branches of nerves ; by which pain, to a certain degree, will be induced.

It commonly happens, however, that any pain which at first takes place in wounds, is not so severe as to require any particular management : and in general, it subsides entirely upon the removal of any extraneous bodies which have been introduced ; by protecting the injured parts with proper coverings ; and by a plentiful formation of matter. But in a few cases the pain continues violent after every usual method of removing it has been attempted. Opiates in large doses are in such circumstances more to be depended on than any other remedy ; and they do not often fail in giving relief. But it frequently happens that their effect is only temporary, the pain being apt to recur after the strength of the opiate is exhausted.

In this event we are to search with much care for the cause of the pain. It may proceed from some particles of extraneous matter which have not been discovered ; from inflammation of the wounded parts ; or from some portion of a nerve or of a tendon being partially wounded without being divided ; or from irritation over the whole surface of the sore.

We should therefore, in the first place, examine the wound with attention, so as to be as certain as possible that no extraneous matter has found access to it : for when pain is produced by any foreign body lodged in a wound, the removal of it will, for the most part, procure immediate relief ; while no remedy that can be advised will have any effect as long as it is allowed to remain. When any thing of this kind is not readily discovered ; or when the particles of any extraneous matter that may be lodged in a wound are so small that they cannot be removed with the fingers ; we have already advised the injecting of warm water, by which they will often be washed out when every other trial has failed. But when this does not succeed, it sometimes answers to immerse the wound for a considerable time, perhaps for an hour, morning and evening, in warm water, or in warm milk ; by which particles of matter are sometimes dissolved and carried out, which would otherwise have continued to excite much uneasiness.

If no trial, however, which may be made for this purpose, should prove successful, we must look for some other cause of the pain ; and it will often be found to originate from inflammation. When the external parts of a wound are inflamed, the cause of the pain is at once rendered obvious ; for even the slightest degree of inflammation is very readily discovered. But it sometimes happens that the periosteum, and other deep seated parts, are affected in this manner without any external marks of it appearing. This, however, is only the case for some short period after the inflammation has commenced : for even when it first attacks parts that are deeply seated, it commonly spreads in the course of a day or two, so as to be discovered outwardly ; and when this does not happen we may in general be directed to the cause, by the heat of the patient's body ; by the state of his pulse ; and by the degree of thirst, which in every case of this kind are always increased.

When these general symptoms of fever run high, it is sometimes necessary to take away considerable quantities of blood by one or more general blood lettings. But for the most part this measure is not necessary, and our views are obtained with more certainty by local blood letting from the edges of the wound; by means of leeches. In such circumstances, indeed, no remedy will prove so successful as the discharge of blood in this manner. I have long been in the daily practice of using it in every wound where inflammation proceeds to any height; and I have often seen great advantages result from it. In cases of pain proceeding from this cause, I have known the application of a few leeches to the edges of a wound, procure immediate relief, even where large doses of opiates, as well as other remedies, had previously been tried in vain. And that it is not the quantity of blood, but the manner of discharging it, which proves successful, is evident from this, that the pain is often relieved immediately on a few drops being taken away by means of leeches, which did not yield in any degree to the loss of a considerable quantity by venesection. In using leeches for this purpose, they should be applied as near as possible to the edges of the wound; nay, when they will fix within the wound itself, the practice proves still more successful: but unless the inflammation be very deeply seated, this measure will seldom be necessary. It sometimes happens, however, as we have observed above, that in deep wounds no inflammation of any importance appears externally, while the periosteum is discovered to be much inflamed and very painful. In this situation nothing affords so much relief as scarifications made in the inflamed membrane, either with the shoulder of a lancet or with the point of a scalpel. Nor need we hesitate in putting them in practice, on the supposition of their being apt to produce exfoliations of the bone beneath. Instead of this, they tend more certainly than any other remedy to prevent them: for exfoliations seldom hap-  
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pen merely from the periosteum being divided ; of which we have daily instances in wounds penetrating to this depth, which are rarely attended with this effect ; unless the bone itself be at the same time considerably injured. In different cases I have scarified the periosteum in the manner here recommended, which in the mean time tended always to remove the inflammation ; while in no instance was it productive of any disagreeable consequences. On the contrary, there is nothing more apt to induce exfoliation than an inflamed state of the periosteum, when it is allowed to proceed to the length of suppuration : and we know no remedy by which this is with such certainty prevented as by incisions made in the inflamed parts, and carried to such a depth as to remove the tension which commonly takes place.

After as much blood is discharged as may be judged proper, whether by leeches or scarifications, no application will prove so useful as warm emollient poultices and fomentations frequently renewed : for in such circumstances nothing will afford such effectual relief as a plentiful suppuration being induced. We constantly observe, that as long as a wound remains dry on the surface, the parts are tense, much inflamed, and very painful ; and that they become lax and easy as soon as they are properly covered with purulent matter.

For the most part, the means we have mentioned will be attended with the desired effect ; and especially if the operator be not too timid in making the scarifications : for we must again observe, that they may be done with much more safety and freedom than is commonly imagined ; and when membranes in any situation are much inflamed, nothing with which we are acquainted will so certainly prevent the accession of gangrene as deep and free scarifications. Even this remedy, however, will not always succeed : for in some cases the inflammation, instead of abating, becomes more and more violent, till at last it terminates in mortification. But as we have elsewhere treated fully of this

this subject, it is not at present necessary to enter upon it.\*

When wounds are attended with violent pain, proceeding from inflammation, the cause is for the most part very readily discovered. But severer pain sometimes exists independent of inflammation: for although much pain very seldom fails to induce an inflamed state of a wound at last, it will often subsist for a considerable time before this takes place. In such cases, and especially where we have no cause to suspect that it arises from the lodgement of extraneous matter, it will probably be found to proceed from the partial division of a nerve or tendon: for we know, that in various instances the most excruciating pain has been induced in this manner.

In some cases, the pain produced in this way is effectually relieved by putting the injured parts into a relaxed state; but, for the most part, the only remedy upon which we can depend is a complete division of the wounded nerve or tendon: and as this is a means of cure which may at all times be practised without risk, it should never be delayed when the pain is found to proceed from this cause; and especially when, from its violence, there is reason to suspect that it may induce convulsions or any other alarming symptoms. As a free use of the scalpel, however, is necessary, patients in general do not easily submit to this division; nor do we commonly find that practitioners are apt to recommend it. But I can say from different instances of its beneficial effects, that we ought more frequently to practise it: for it seldom fails to afford immediate relief, even in the severest degrees of pain; and I never knew any bad effect result from it. It ought always, however, to be advised as soon as any other means that may be employed have failed: for when violent pain has subsisted so long as to induce any material affection of the convulsive kind, even this remedy will not readily remove it. On the parts being  
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\* Treatise on Ulcers, &c. Part I.

freely divided, they should be placed in a relaxed posture ; and an emollient poultice being laid over them, if the practice proves successful, the patient will soon find himself relieved from his distress, and the wound may afterwards be treated in the usual way. But when it fails, as it will be apt to do, when from timidity, or any other cause, it has been long delayed, there will be much cause to suspect that the patient will at last die convulsed, notwithstanding the use of opiates, and every other remedy that may be employed.

In some cases again, the pain which occurs in wounds, instead of being deep seated, which it always is when it proceeds from an affection of any particular nerve or tendon, is found to originate from a peculiar degree of irritability of the nerves on the surface of the injured parts. The pain, in such instances, is not very severe ; but it often proceeds to such a length as to excite much uneasiness, by which the patient is apt to be deprived of rest, and the matter discharged from the sore to be rendered sharp and acrid.

For the removal of this kind of pain, emollient poultices, and other warm applications, are commonly employed ; but seldom with any advantage. Indeed they often seem to increase the irritability. Large doses of opium afford the most certain relief ; and a solution of opium in water, or a weak solution of saccharum saturni, are the best external remedies. When of a proper strength, they commonly prove successful.

While treating of the cause and removal of pain in wounds, it was necessary to mention inflammation, with the means best adapted for the cure of it. We have now to attend to the nature and treatment of some convulsive affections which injuries of this kind sometimes induce.

Subsultus tendinum, and other spasmodic affections of a slight nature, are frequent consequences of wounds : They are more particularly apt to occur from the amputation of limbs, when they often prove the

the cause of much uneasiness and pain ; for the starting which they are apt to excite in the affected limb, produces a violence of action which muscular parts newly divided are not well fitted to support. And when they are severe, and return frequently, they prevent the dressings from being kept properly applied, at the same time that they are often the cause of hemorrhages from arteries which have even been tied with ligatures. We ought, therefore, in every instance, to treat them with attention. Indeed the risk of their producing hemorrhages is so considerable, and the sensations which they communicate to the patient are so disagreeable, that a prudent practitioner will at all times consider them to be of importance.

As these convulsive twitchings are evidently the consequences of pain and irritation produced by the wound, it is obvious that those means are most likely to prove effectual in removing them which are most powerful in procuring ease. Hence much advantage is derived from placing the patient's body, and especially the affected limb, in the easiest posture : indeed more benefit is derived from it than we are often aware of. I have known severe degrees of this affection relieved almost immediately, by changing the posture of a stump. But when this does not prove successful, opiates will seldom fail.

It is worthy of observation, in using opium for this purpose, that it answers better to give it in small doses frequently repeated, than to give large doses at once. The latter often produce sickness, and even vomiting ; and after their effects are over, the spasms are apt to become more severe than they were at first ; which we seldom find to happen when the remedy is used in smaller doses, and repeated at proper intervals.

There are other convulsive affections, however, still more alarming, which even in this country sometimes occur from wounds, but which happen much more frequently in warm climates ; the locked jaw, and tetanus. These affections proceed, in many instances indeed,

indeed, from other causes; the nature of which we cannot discover: but when they are not obviously induced by deep or extensive wounds, they may often be traced, by a more minute investigation, to some slight injury done to the surface of the body. Even the slightest scratch, which does not penetrate to a greater depth than the skin, has been known to induce them.

As we know that severe degrees of pain are often productive of involuntary contractions of such muscles as have been injured, we would naturally expect that extensive wounds would be frequently attended with this effect. But we do not so readily see how the most violent affections of this kind should occur from such wounds as are so slight as scarcely to be noticed, and which never of themselves produced much uneasiness.

Nor do injuries of greater importance induce these symptoms so readily while they are recent and painful: for they seldom occur in large wounds till the cure is far advanced; and in some instances, particularly after the amputation of limbs, they are never more apt to appear than when the cicatrix is nearly completed. At least this has been the case in almost every instance of this kind which I have met with in this country; and we are told from very certain authority, that the same observation has been made in warm climates.\*

The cause of this may be difficult to explain; but our knowledge of the fact leads to some advantage in practice. We have hitherto been made to suppose, that the locked jaw, and other convulsive symptoms which sometimes succeed to wounds, are most apt to occur from the violence of pain induced at, or soon after, the time of wounds being inflicted; and therefore practitioners have guarded with most assiduity against them while the pain has continued severe. But when it is known that they seldom or never occur at this period, and that they frequently appear in more advanced

\* Vide Observations on the diseases incident to Seamen, by Gilbert Blane, M. D. &c.

ed stages of wounds, those means of prevention which are found to prove most effectual, will more readily act with advantage if applied at this time.

Practitioners, therefore, in warm climates, should be particularly attentive in the advanced stages of wounds; and the most effectual remedy which can be applied on the first appearance of a locked jaw, is immersing the patient, so as to cover the whole body, in a warm bath. The heat of the bath should be regulated by the feelings of the patient; and he should continue in it as long as he is able to bear it. Water is commonly used for this purpose; but where milk can be procured, it should be preferred: for as a warm bath proves, in cases of this kind, chiefly useful by its relaxing powers, we have reason to suppose that the oily particles contained in milk render it particularly proper; and the idea appears to be well founded by the beneficial effects which in different instances have resulted from the use of it.

It may often happen, however, that milk cannot be procured in quantities sufficient for this purpose. In such situations, fat broths, or water combined with oil in any other manner, may be used instead of it. When one application of a bath proves successful, the use of it need not to be continued; but for the most part several repetitions of it are necessary. Nor are we to imagine that warm bathing is a certain remedy. It has frequently indeed proved highly useful, and many cures have been accomplished by it; but we must likewise confess that it has often failed, and that patients are daily carried off in warm climates by the locked jaw, and other convulsive symptoms, notwithstanding the most ample application of the warm bath, and of every other remedy that has hitherto been employed.

The failure of warm bathing has induced some practitioners to make trial of the cold bath; and in some convulsive affections it has certainly proved useful; particularly in cases of universal tetanus: but as yet it has not been so frequently employed as to enable us

to judge, with precision, whether it will often prove useful or not in the locked jaw ; which we are to consider as the most obstinate as well as the most dangerous symptom of this kind.

At the same time that we persist in the use of warm bathing, other remedies ought not to be neglected ; and of these opium is the most certain. It proves useful both as an external application and as an internal medicine. By rubbing the contracted muscles with laudanum, or by keeping them covered with an extract of opium, or with opium merely softened with spirits or water, the spasm has in some instances been lessened : but the most effectual relief obtained from this remedy is by giving it inwardly ; not in large quantities as we have remarked above, but in small doses frequently repeated. The doses should be such, however, as may effectually allay the pain and uneasiness produced by the disease ; but more than this is unnecessary : and, when exhibited in large quantities, it seems to do mischief, by inducing that very state of the system it was meant to prevent, namely, a great degree of irritability : for as soon as the operation of a large dose of opium is over, we commonly find, in all spasmodic affections, that the disease returns with double violence. But this may be easily prevented, by giving such doses as the patient can easily bear, and repeating them at short intervals, in such a manner that the effects of one may not be over before another is given. *Æther* and milk have sometimes been conjoined with opium ; but no advantage of importance has been derived from them.

We have mentioned opium as an external application ; but the remedies of this kind from which we would expect most advantage are emollients, freely applied over all the contracted parts. The nature of the disease seems strongly to point them out ; and experience has, in some instances, shown that they may be used with advantage. Emollients of every kind may be used for this purpose ; but animal fats of the  
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softer kinds seem to be preferable : for they certainly prove more powerfully relaxing in all cases of contracted muscles than any of the vegetable oils : at least, in the course of my experience, they have uniformly proved to be so. By boiling recent bones in water, a very pure oil of this kind is obtained ; and the fat of all kinds of fowls answers well.

Mercurials have been frequently given in diseases of this kind : but if mercury has ever proved useful, it has been in such cases only where it was rubbed upon the contracted parts in the form of an ointment, and where it would probably act with advantage as an emollient.

When a locked jaw occurs from a wound in any of the extremities, if the disease does not yield to the remedies we have mentioned, it has been proposed to amputate the member ; and in various cases this has been practised. I am sorry, however, to observe, that we have scarcely an instance of its proving effectual : for in this disease, as in almost every spasmodic affection, the effect is apt to remain after the cause is removed. We have therefore no encouragement, from past experience, to put this remedy in practice. Instead of proving useful, the disease has, in different instances been evidently rendered worse by it. The remedies therefore which we have to trust to, are those we have mentioned above, namely, the warm bath, opiates, and a very free application of emollients.

While we are depending on these for effecting a cure, the patient's strength should be supported by mild nourishment given by the mouth, when this can be done ; and by glysters of strong broths, when the jaws are so firmly contracted as to prevent food from being received by the mouth : And we may, by removing a tooth or two, even in cases of this kind, convey food to the stomach ; so that wherever the symptoms of locked jaw are observed to be approaching, one or two of the teeth should be taken out, as they cannot

cannot be removed but with much more difficulty after the jaws are firmly clinched.

Having thus considered the various circumstances relating to wounds in their most usual form, with the means of cure adapted to each of them, we shall now proceed to mention more particularly some varieties in those affections which point out a different mode of treatment ; and these are, punctures, laceration, and contusion.

### SECTION III.

#### *Of Punctured Wounds.*

**A** WOUND is said to be punctured when it is made with a small pointed instrument ; and when the external aperture, instead of being wide and extensive in proportion to the depth, is small and contracted. A wound made by a thrust of a small sword is of this kind.

Wounds of this kind prove, in general, more hazardous than incised wounds of a much greater extent ; from deep seated nerves and other parts of importance being more apt to be partially hurt ; from extraneous bodies being carried to a depth from whence they cannot be easily removed ; from the discharge which they afford being more apt to lodge ; and from the sides of the punctured parts being in many instances made to adhere with difficulty. These are points of the utmost moment, not only from their being often productive of much distress to patients, but from the embarrassment which they give to practitioners ; who are more apt to fail in their treatment of this variety of wound than of any other which falls within their management.

It is obvious, that all the risk which occurs in these wounds proceeds from their being so contracted, that free access cannot be got to their full depth : And it  
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is equally evident that this can be obviated only by laying them freely open. Indeed, this is the idea which, in the treatment of punctured wounds, we should always keep in view, that of converting them as far as possible into incised wounds with wide extensive openings. This, however, is a question about which practitioners are not agreed : Some advise the openings of punctured wounds to be enlarged either with tents or with the scalpel ; while others allege that this is seldom requisite. And they have also differed with respect to the time at which any dilatation of this kind should be made ; for while some advise it to be delayed for a few days only, others do not attempt it till every other means have failed.

In the treatment of punctured wounds our views ought to be the same as in cases of sinus. Indeed, a wound of this kind is exactly a sinus in a recent state ; and by considering it as such, the means of cure that will most likely prove successful are at once pointed out. In every sinus, our intention is to procure a reunion of the parts which have been divided ; but we know from experience that this cannot be effected till a certain degree of inflammation is induced upon them. For this purpose, the introduction of a cord or seton along the course of a sinus has frequently proved successful ; and some have, with the same views, employed irritating injections. When by these means the internal surface of the sinus is sufficiently inflamed, the cure is to be completed, by compression applied in such a manner as to keep the parts intended to be united, in close contact, till a sufficient degree of adhesion is produced. Now, in the application of this treatment to punctured wounds, it is obvious, that the previous steps which we have mentioned for exciting inflammation, would seldom if ever be necessary ; for one certain effect of every wound is to induce inflammation over all the parts which have been injured : So that *a priori* we should be led to conclude, that compression alone would in all such cases prove successful ;

successful ; for we know that it seldom fails in other cases of sinus where a due degree of inflammation is induced. But we are deterred, in punctured wounds, from the immediate use of this remedy ; at least where they penetrate to any considerable depth, from our uncertainty with respect to extraneous bodies being lodged in them or not, and from the inflammation in wounds of this kind being apt to run too high. In superficial wounds, indeed, where we are certain of being able to extract any extraneous matter, and where the inflammation is for the most part moderate, compression may be employed immediately ; and when properly applied, it will not often fail. But for the reasons just mentioned, it can seldom be employed with safety in wounds of much importance.

The practice I have long adopted in wounds of this kind is this : When they run in such a direction as to prevent a seton from being carried along their whole course, I lay them open immediately from one extremity to the other, or as far as it can be done with safety, either with a probe pointed bistoury, or with a scalpel and director : and this being done, the parts are dressed in the manner we have advised above, in cases of simple incised wounds. But when it appears that a seton can with propriety be used, emollient poultices are first applied, and continued till a free suppuration is induced, and till there is no longer any cause to fear that the symptoms of inflammation are to proceed too far. A cord is then introduced nearly equal to the size of the opening ; and being allowed to remain till there is reason to imagine that any extraneous matter lodged in the wound is discharged, it is then gradually lessened, by taking away a thread or two every three or four days ; and when reduced to a third or fourth part of its original thickness, it is taken out entirely ; when the remainder of the cure is for the most part easily effected by the application of moderate pressure along the course of the wound.

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When a punctured wound is laid open at both ends, a cord may be easily introduced by means of a blunt probe, with an eye at the end of it. But when the instrument has not passed through the integuments on the opposite side to which it entered, a counter opening must be made, either by cutting with a scalpel on the round end of a blunt probe, or by passing a lancet pointed needle, covered with a canula, along the sinus, and pushing it out at the opposite side with the seton attached to it.

In either of these ways the cure of such wounds may often be accomplished. But wherever the practice is admissible, I am clearly of opinion, that laying them open immediately after the accident, is preferable to the other : for by means of it all extraneous bodies are at once brought into view ; hemorrhagies are easily restrained ; and all that pain and trouble which sometimes occur from a partial division of nerves or tendons are directly obviated. Nor is the inflammation, which often succeeds to punctured wounds, apt to run so high as it usually does when any other mode of treatment is adopted. So that much distress would be prevented, and much time saved, if this method of cure was more generally practised. To those not much accustomed to this kind of business, the enlarging of a small puncture, so as to form an extensive wound, appears to be unnecessary and cruel : but whoever has seen much of this branch of practice will know, that the greatest distress often arises from the smallest punctures ; that surgeons are often baffled and much disappointed in their treatment of them ; and he will soon find, that nothing so effectually obviates this as the practice we have mentioned, that of laying the punctures freely open as soon as possible after they are inflicted. Indeed, the sooner it is done, the better. No advantage can accrue from delaying it ; and a patient always submits to it most readily at first, while at the same time it is productive of less pain than it must necessarily give when the parts are swell-  
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ed and inflamed, which they commonly are, in the course of a few days from the time of such injuries being inflicted. In every wound therefore, of this kind, particularly in those which are often received in duels with small swords, and in battles with the points of bayonets, the enlargement should take place even before the parties are carried from the field; by which many inconveniences which naturally attend these injuries would be prevented.

There are some cases, however, in which this practice cannot with propriety be followed; in punctures which run deep among the large muscles; and especially in such as are contiguous to any of the large blood vessels and nerves. As more danger would accrue from wounding these than could probably be compensated by any advantage gained by dilating the wounds, it is better in such circumstances to rest satisfied with laying the parts open as far as it can be done with safety; to trust to the suppuration which will ensue for bringing off any extraneous matter that may be lodged in the wound; and to a proper application of pressure for completing the cure. Or the practice we have mentioned above, of introducing a seton, may be attempted; for a cord may be passed with safety where it might be very improper and even dangerous to make a deep incision.

But it is proper to observe, that there are some cases in which even a seton cannot be introduced: for a puncture sometimes runs in such a direction, as not to admit of a counter opening. We must here trust to a proper application of pressure, not merely for preventing any lodgement of matter, but for effecting a cure by producing an adhesion of the divided parts; and when this fails, injections of a moderate degree of astringency may be used with advantage: but as remedies of this kind tend to counteract the very intention for which setons are employed, they should never be advised till it appears that the latter will not succeed. Setons, as we have already observed, prove

useful, by exciting inflammation along the course of a sinus. Now, one usual effect of astringent applications is, to diminish or even to remove inflammation. They should never therefore be employed till all the ordinary means of cure have failed, when they may be used with a view to check the flow of matter when it is discharged in too great quantities, and in order to induce some degree of callosity over the sides of the sores.

We think it right in this place to remark, that practitioners have differed much in their opinions with respect to the use of astringent injections in wounds: for while some are in the daily habit of employing them, others have said that they are always pernicious, and ought never to be used. In the early stages of wounds they can never be necessary; and as they may do harm by washing away the matter too freely, they should never be used as long as a cure is expected, either by the formation of new granulations, or by adhesion: but whenever we have reason to conclude that this cannot probably happen, we may with propriety recommend them. Various forms of them are mentioned by authors; but none of them are so harmless, and at the same time answer with such certainty, as weak solutions of *saccharum saturni*. Lime water is used with the same views: and water strongly impregnated with alum, or mixed with an equal quantity of claret or port wine, is often employed with success.

In the treatment of punctured wounds where setons cannot be employed, it is sometimes difficult to prevent the external aperture from closing long before any tendency to heal appears in the bottom of the sore; and if it be not prevented, much mischief is apt to ensue by matter collecting beneath, and bursting out from time to time. With a view to prevent this disagreeable occurrence, tents are employed of prepared sponge, gentian root, and other articles, which, by swelling with the moisture of the sores, serve very effectually

effectually to keep them open. But while they answer this purpose, they are very apt to do mischief. When the opening of a sore is plugged up with a tent, the matter which forms can never be discharged but at the renewal of the dressings; by which means it will necessarily collect in such quantities as to give rise to absorption, as well as to the formation of sinuses, by the matter spreading between the layers of the contiguous muscles. Tents, therefore, which are of solid materials, ought never to be of such a magnitude as to fill the openings of sores. They will not readily do harm when they are of such a diameter as to admit of a discharge of matter while they are inserted. But when they are employed of such sizes as to fill the openings entirely, they ought always to be hollow; by which the apertures into the sores will be prevented from contracting, while the matter will be discharged as quickly as it is formed. For this purpose practitioners should be provided with tubes of different forms and sizes, so as to be able to suit any aperture they meet with. Silver tubes are commonly employed; but those of lead answer better. Being softer than the others, they do not create so much uneasiness, and they are more readily formed into any particular shape, so as to answer for sinuses of a straight or crooked direction.

We must observe, however, that tents and tubes of every kind should be used with caution; and it is more particularly necessary that this should be held forth to beginners, for there is no point in practice in which they are more apt to err. As they are early made sensible of the danger which ensues from matter being allowed to collect in sores, they very universally fly to the assistance of tents wherever a puncture or a sinus is discovered. But it is right they should know that tents are seldom necessary: for when once a vent is given to matter, the opening will in general be preserved merely by the continuance of the discharge,

In a few instances, indeed, it is otherwise ; and in all such cases the leaden tubes should be preferred.

We come now to speak of those wounds which are attended with laceration and contusion ; and as both of these circumstances require nearly the same method of treatment, it will not be necessary to speak of them in separate sections.

#### S E C T I O N    I V .

##### *Of Lacerated and Contused Wounds.*

A WOUND is said to be lacerated, when the parts, instead of being divided with a sharp cutting instrument, are forcibly torn asunder ; and when, instead of a smooth equal surface, the edges are ragged and unequal : And we conclude, that contusion takes place when a wound has been made with a blunt or obtuse body.

Contused and lacerated wounds differ in many points from simple incised wounds ; but in nothing more than in this, that while they are commonly more hazardous, they seldom at first exhibit such alarming appearances. Thus a simple cut, which commonly heals with ease, is often attended with a much greater retraction of the divided parts, and with more profuse hemorrhagy than a contused or lacerated wound. Indeed, it is a frequent effect of contusion and laceration to prevent the effusion of blood, by which inattentive observers, in forming opinions of injuries of this kind, are very apt to be deceived : for as hemorrhagy is the most alarming symptom with which wounds are attended, when it does not occur to any great height, they are apt to conclude that nothing bad can happen. Practitioners of experience, however, will not be deceived by this : for it has long been known, that injuries of this kind prove always more dangerous than any other kind of wound ; and the  
more

more violent the contusion or laceration has been, the less blood is always poured out, insomuch that there are instances even of limbs being torn off without any hemorrhagy ensuing.

The pain of lacerated and contused wounds generally varies according to the violence of the injury. Thus, in lesser contusions, the pain is often severe, while it is apt to be inconsiderable where the nerves of any part have been completely destroyed.

The immediate effect, both of laceration and contusion, is swelling or tumefaction, which always takes place in a greater or lesser degree in the retracted edges of the wound. This seems to be the consequence of effusion into the surrounding cellular substance. When the violence has not been severe, this effusion commonly terminates in suppuration; the contused parts separate from those beneath in the form of sloughs; and a cure of the remaining sore is obtained by the means we pointed out when speaking of simple incised wounds. But when the parts are so much injured as to have their texture much destroyed, and especially when any of the larger arteries have been obliterated, there will always be cause to suspect that mortification will occur. In sound constitutions, and where the wound is not extensive, even this will not often prove fatal: for in such circumstances the mortified parts commonly fall soon off, and a cure is afterwards effected in the usual manner. But in wounds attended with contusion or laceration to any considerable extent, if the habit of body be not perfectly good, the gangrene which ensues is always to be considered as hazardous: for the disease does not necessarily stop with the parts which have been injured; but is apt to proceed to those which were not immediately hurt by the accident.

And again, even where mortification does not succeed immediately, when parts have been either much lacerated or contused, such a violent degree of inflammation is apt to occur as often terminates in mortifica-

tion, notwithstanding all our endeavours to prevent it; and in whatever way the disease be induced, it is always attended with much danger: for besides the risk of parts being destroyed by it, which are immediately necessary for life, the absorption of putrid matter from a gangrenous surface, proves often suddenly fatal, even when the size of the sore is so inconsiderable as to give no cause to suspect danger.

It is therefore obvious in the treatment of contused and lacerated wounds, that our principal object is to guard against the accession of gangrene. But it is likewise clear, that this is not always to be done by the same sort of means: for we may readily suppose, that much advantage may be derived from blood letting, and other evacuations, where the injured parts are highly inflamed, while no benefit would probably result from them in any other situation. This, however, is a point of importance, and merits particular attention.

In lacerated or contused wounds, where the parts are much injured, it is the common practice to give large quantities of bark almost immediately, and to apply warm dressings and other antiseptics with a view to prevent gangrene. It is evident, however, that the indiscriminate adoption of this practice must frequently do mischief: for however beneficial it may be in particular cases, where gangrene has already taken place, it is certain that it will rather do harm where symptoms of inflammation still continue violent; and unless mortification actually exists, it is not clear that in any instance it will prove serviceable; for although we have various proofs of the efficacy of bark in putting a stop to the progress of gangrene, I have never in any case been sensible of any advantage being derived from it when used as a preventative of it.

Gangrene may arise in these wounds from two causes: From the stoppage of the circulation by the total destruction of the large blood vessels of a part; and from violent inflammation.

Gangrene, proceeding from inflammation, is most to be dreaded here ; for that which arises from the destruction of blood vessels is by no means so frequent. The inflammation therefore which takes place in wounds of this kind, will always demand our attention in the first place.

As the hemorrhagy, subsequent to contusion or laceration, is seldom alarming, and as blood discharged from any of the vessels that have been injured tends more effectually than any other remedy to prevent inflammation ; such quantities should be taken away in this manner as the nature of the injury may indicate, and as the strength of the patient may admit. After this, if the divided arteries continue to throw out blood, they must be secured by ligature : for till the discharge of blood be stopped, the patient will not consider himself as safe ; nor can the wound be examined with accuracy. The parts are now to be cleared of all extraneous bodies, as far as this can be done with propriety, and are to be placed as much as possible in their natural situation ; but no kind of future should be employed for their retention. If the violence which has been done to them has been considerable, and especially if the patient complains of much pain, it will be still necessary to take away blood in proportion to the strength of the patient : and as local blood letting proves in such cases always highly serviceable, the best method of discharging it is by means of leeches, applied as near as possible to the edges of the sore. Indeed no remedy, I have ever employed proves so certainly useful as the discharge of blood in this manner ; for it not only tends to prevent the inflammatory symptoms from running high, but it very commonly renders the pain moderate, even when it has previously been severe. It ought never therefore to be omitted ; but the practitioner should take care that it be proportioned as nearly as possible to the violence or urgency of the symptoms : for the discharge of a small quantity of blood will in some cases of contusion

tusion or laceration prove fully sufficient ; while in others, it is necessary to repeat the operation once and again.

As soon as a sufficient quantity of blood is discharged, the parts affected, after being dressed with pledgits of any emollient ointment, should be completely covered with a warm emollient poultice ; and this, together with warm fomentations, should be renewed three or four times a day, so as to promote, with as much certainty as possible, the formation of pus. To induce suppuration in wounds of this kind, is indeed an object of the first importance : it generally relieves all the symptoms ; and till such time as it takes place, we have often reason to dread the event.

We commonly find, when sores of this description become covered with good pus, that the pain and tension abate ; and such of the parts as have been much lacerated and contused, and which hitherto have been sloughy or perhaps black with mortification, begin now to separate from those beneath ; and this being accomplished, they may in general be cured in the same manner with wounds of any other kind. Nay, when brought to this healing state, we may even attempt with safety to expedite the cure by drawing the edges of the retracted skin into contact, either by means of the uniting bandage or with adhesive plasters ; for although this would be improper in the commencement of such wounds, while there is any risk of the tension and inflammation proceeding too far, it may with much propriety be advised when there is no longer any reason to be afraid of these symptoms.

When practitioners are immediately called, so as to employ the means we have mentioned in due time, they will not often fail in ordinary cases : but it frequently happens, whether from the violence of the injury, the tendency in some constitutions not only to inflammation but to gangrene, or from the proper remedies not being timely applied, that all the symptoms become daily worse, and, notwithstanding re-  
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peated blood lettings, both general and local, all those parts which were at first inflamed become perfectly black and mortified. We are not now to trust to evacuations : on the contrary, whatever tends to debilitate should be avoided ; and we know from experience, that, in this situation, no remedies prove so useful as those which invigorate and restore the tone of the constitution.

With this view, the patient should be desired to live upon nourishing food. He should be allowed as large a quantity as he can take, of good wine, or of strong malt liquor, or of both ; and Peruvian bark should be given in as large doses, and these should be as frequently repeated, as his stomach will permit. Indeed bark is perhaps the only remedy on which we can place any dependence ; and as we know from experience that it may with safety be given in great quantities, it should always be exhibited in cases of this kind without farther limitation than what necessarily arises from the state of the stomach. We may remark, too, that it proves in general useful nearly in proportion to the quantity which is taken ; and it often happens, that large doses are not more nauseated than those which do not contain above half the quantity. Where it is of importance to throw in a large quantity of the remedy in a short space of time, as is always the case in gangrene, it should never be given in less than doses of a dram, or even of two drams when the patient can bear it ; and these should be repeated every hour. Bark, in some cases, seems to prove more powerful when conjoined with the vitriolic acid : elixir of vitriol may therefore be given along with it. In gangrene arising from debility, opium frequently proves useful ; and as it does not counteract the bark, the two remedies may with safety be prescribed together.

In the mean time, the state of the sore must be particularly attended to. As long as there is any tendency in the contiguous parts to inflammation, the best applications, perhaps, are warm emollient poultices  
and

and fomentations ; for, as we have elsewhere shown, that the separation of mortified parts is commonly effected by a suppuration taking place between them and the adjoining sound parts, we necessarily derive most advantage from whatever tends to promote it.\* But as no suppuration will occur without some degree of inflammation, when there is no reason to imagine that this will otherwise happen, we should endeavour to excite it by the application of warm dressings to the sore, and especially by the use of stimulating substances to the contiguous sound parts. Mustard applied in the form of a poultice, as well as some others of the rubefacients, have proved useful in this manner ; and I have employed with advantage a strong solution of crude sal ammoniac in vinegar and water. It is proper, however, to observe, that this practice must be managed with caution : for much inflammation might often prove detrimental, while in every instance it would be unnecessary ; for we know from experience, that a small degree of it proves always sufficient. As soon, therefore, as it is observed that the mortified parts are surrounded with a kind of inflamed ring, the stimulating applications should be removed in order to give place to warm emollients for the purposes mentioned above. Any parts that are completely mortified may with safety be removed ; indeed the offensive smell which they produce renders this a necessary measure : but the common practice of making incisions through the diseased parts into those beneath which are still sound, should never be adopted. No advantage can be derived from it, and it may be productive of much harm. It is recommended with the view of giving more free access to the ointments, and other remedies used as dressings, than could otherwise be obtained ; but I have not in any instance seen it prove useful, and in different cases I have been sensible of its doing mischief. It may very readily carry the

\* Vide Treatise on Ulcers, &c. Part I. where this subject is more fully considered.

the putrid matter of gangrene more deeply into the contiguous sound parts than it would otherwise penetrate. In some cases it has evidently induced more inflammation than was necessary; and in more instances than one I have known scarifications prove hurtful, by exciting very troublesome hemorrhagies.

By persisting in the use of bark, and of the other remedies we have just mentioned, and especially if the strength of the patient be supported with wine and nourishing food, even bad cases of gangrene will often terminate happily; the mortified parts will separate, and the remaining sore will heal kindly and easily with common mild dressings: But in other instances, notwithstanding all our endeavours, the disease will continue to spread, and nothing will prevent its fatal termination. When gangrene is seated in any of the extremities, it is the common practice, when other means of cure fail, and when the mortification is still advancing, to amputate above the diseased parts: we have elsewhere shown, however, that this practice should not be adopted; and when treating of amputation, we shall again have occasion to enter on the consideration of it.

In the treatment of mortification, it is a good general rule to be very sparing of every evacuation from the first appearance of the disease, and this especially with respect to blood letting. But in addition to what I have already observed, I think it right to remark, that in all cases of inflammation where the approach of gangrene is dreaded, and particularly in wounds attended with much contusion or laceration, till mortification actually occurs, we should proceed with freedom in an antiphlogistic course, particularly in discharging as much blood as the degree of inflammation may appear to render necessary; and I insist on this point the more fully, from having often observed much mischief ensue from practitioners being too timid in advising it. Being afraid of sinking the patient too much, they avoid the only remedy that could proba-  
bly

bly save him : for, in such circumstances, it is the violence of the inflammation of which we have most reason to be afraid ; and as we know of no remedy which can with such certainty be depended upon for removing inflammation as blood letting, it should be prescribed with as much freedom as the strength of the patient and other circumstances will permit ; by which the accession of gangrene will often be prevented when all the usual remedies would probably fail.

What we have hitherto said in this and the preceding sections, may be considered as common to wounds in general : We now proceed to consider those wounds, which, either from the nature of the part wounded, or from its situation, demand a peculiar treatment.

## S E C T I O N V.

### *Of Wounds in the Veins.*

**I**T is difficult to restrain the hemorrhagies which sometimes ensue from wounded arteries, on account of the force with which the blood is propelled into them by the heart, and on account of their muscular coats, which prevent them from collapsing readily. But in the veins neither of these circumstances take place ; the contractile power with which they are endowed is very inconsiderable ; and we do not perceive that the circulation in them is much affected by the action of the heart.

For these reasons, wounds in the veins heal with more ease, and are attended with less danger than wounds of the arteries : Indeed we know, that the largest veins are often much injured, and that no bad symptom will ensue ; while very troublesome consequences will follow from wounds even of small arteries. In general, therefore, we have no great reason to be afraid of wounds in the veins : for while we have  
it

it in our power to check the hemorrhagy, we never observe any detriment to ensue even from the obliteration of the largest external veins ; for the anastomosing branches so readily admit of dilatation, that they soon become sufficient for carrying on the circulation beyond the parts affected.

We commonly find, that a longitudinal cut in a vein heals with ease when it is slightly covered with a piece of dry lint or soft old linen : When this fails, the hemorrhagy may be always stopped by the application of a piece of dry sponge or of agaric to the bleeding orifice, and securing it with moderate pressure. But in transverse cuts in the large veins, or when any of them are cut entirely across, it may sometimes happen, either that pressure cannot be properly applied to the wound, or that it does not prove sufficient for stopping the discharge : In such cases, escharotic applications are commonly advised, and by some practitioners the actual cautery is employed ; but none of these can be depended on ; and they are apt to create a good deal of uneasiness. The same remedy therefore should be employed here that we daily use in hemorrhagy from wounds in the arteries, namely, ligatures ; which, when properly applied, neither fail in their effects, nor produce any material inconveniency. In the application of ligatures, we have elsewhere shown, that the crooked needle should seldom or never be used, and that the tenaculum alone should be employed.

## SECTION VI.

### *Of Wounds in the Lymphatics.*

THE lymphatics are equally liable to injuries with other parts of the body : As they often lie contiguous to veins, they are sometimes wounded in the operation of blood letting ; and they are not unfrequently

quently cut in opening buboes and other glandular collections of matter.

When the smaller branches only of lymphatics are opened, we may readily suppose that they will heal along with the rest of the wound; but the wounded lymphatic is sometimes so large, that it does not heal so soon as the other parts, but continues to pour out its contents in considerable quantity, giving a good deal of inconveniency, and at the same time weakening the patient: We should never hesitate therefore in putting a stop to the discharge.

Various means have been proposed for effecting this. In some cases it has been done by compression alone: Astringents have been advised, together with the application of dry sponge, agaric, and of common puff ball; and both the actual and potential cauteries have been used. But when moderate pressure fails, the most effectual remedy is the taking up the injured lymphatic with a ligature, in the same manner as we do wounded arteries. No objection can be made to this, and it answers the purpose in the most certain manner.

## SECTION VII.

### *Of Wounds in the Nerves and Tendons, and of Ruptures of the Tendons.*

WHEN treating of blood letting, as well as in a preceding part of this chapter, I had occasion to speak of the consequences which sometimes ensue from partial divisions of nerves and tendons, and of the means which seem to be best adapted for removing them. At present it might be sufficient to refer to these parts of the Work; but I shall now make a few additional observations.

It must often happen, that nerves and tendons are partially divided along with other parts; but when

no pain arises from it, this accident does not particularly come under the observation of practitioners. In such cases they heal along with the other parts of the wound: But in various instances, either from some singular degree of irritability in the injured parts, or from a peculiarity of constitution, which we cannot explain, the slightest puncture of a nerve or of a tendon, will induce very severe pain, inflammation, convulsions, and even death.

Whenever we have reason to suspect, from the violence of the pain, that the other symptoms may supervene, the most effectual means should be immediately used for preventing them: for when once convulsions take place, we are never certain of being able to allay them. In some cases, large doses of opiates answer the purpose: but when they do not very quickly prove successful, no time should be lost in putting the only remedy in practice, on which we can place much dependence; and that is, the complete division of the injured nerve or tendon. By this we may indeed induce a certain degree of insensibility in the parts beneath, or they may even be deprived of the power of voluntary motion; but any inconvenience which this may occasion will be trifling, when compared with the advantages which result from the operation: For I can from experience assert, that it seldom fails in removing all the symptoms, when it is timely employed; while, in different instances, wounds of this kind have terminated in death where it has been omitted.

In this manner we may obviate the effects of punctures and partial wounds, either in the nerves or tendons: But it is necessary to mention the method of treatment to be pursued in the healing of wounds or ruptures of the large tendons, when they are completely divided. As a complete division of any of the large tendons is always attended with much retraction, it was long ago inculcated by practitioners, to draw the retracted extremities of the ruptured tendon into contact,

tact, and to retain them in this situation by futures : and this being done, and the limb placed in a favourable situation, the rest of the fore was treated in the usual way.

There is no reason to doubt of cures having been often accomplished in this manner : nay, where tendons have been merely ruptured, without any external wound, as often happens with the tendo Achillis, the retracted ends of the tendon have been laid bare by an incision, for the very purpose of retaining them by futures. This, however, is a very painful operation ; and as the same intention may be accomplished in a much more simple manner, it ought to be laid aside. When it was first proposed to unite ruptured or wounded tendons by means of futures, it was the common opinion, that in order to insure a reunion of divided parts, it was absolutely necessary to bring them into close contact ; and the same idea prevailed, not merely with respect to tendons, but with regard to bones, as well as other parts.

In the treatment of fractured bones and of ruptured tendons, it is no doubt a right general rule to endeavour to bring the divided parts as nearly into contact as possible : but we now know that cures may be accomplished where the retraction of parts is so considerable as to render it impossible to draw them together ; nay, that it has often been done, even where a portion of a tendon or of a bone has been completely removed. • Very considerable portions of bone have been regenerated ; and although we are not certain that any part of a tendon has ever been renewed, yet such adhesions always take place between the retracted ends of the divided tendon and the contiguous parts, as tend in a great measure to supply the deficiency. Thus I have known different instances of the tendon of the rotula being ruptured, as well as of the tendo Achillis : and although the ends of the retracted tendons could never be brought within an inch of each other ; yet in all of them where proper attention was given,

given, the cures have been so far complete, that the use of the limbs has been very perfectly restored. Some degree of stiffness has often indeed remained for a considerable time ; but at last even this symptom has very commonly been removed.

Wherever a wounded tendon may be situated, or even where it is only ruptured, without any injury being done to the external parts, the limb should be placed in such a manner as will most readily admit of the retracted ends of the tendon being brought nearly together ; and when in this situation, the muscles of the whole limb in which the injury has happened must be tied down with a roller in such a way as will prevent them from all kind of exertion during the cure, at the same time that the parts are placed in such a position as will tend most effectually to keep them easy and relaxed. Thus, in a wound or rupture of the tendon of the rectus muscle of the thigh, the patient's leg should be kept as much as possible stretched out during the cure, when the thigh should be in some degree bent, so as to relax the muscle itself as far as it can be done. While in similar affections of the tendo Achillis, the knee should be kept constantly bent, so as to relax the muscles of the leg as much as possible ; at the same time that the foot should be stretched out, so as to admit of the ends of the ruptured tendon being brought nearly into contact. In applying a roller to secure the muscles and tendons in this situation, it should be done with a firmness quite sufficient for the purpose, at the same time that care is taken to prevent it from impeding the circulation : with this view, fine soft flannel should be preferred either to linen or cotton : for being more elastic, it more readily yields to any swelling with which the limb may be attacked.

The late Dr. Monro was the first who gave any accurate directions for treating a rupture of the large tendons ; and he has probably done it with the more precision, from having himself experienced the effects of this misfortune in the tendo Achillis. As the

method which he points out, and the instruments which he recommends, are very simple and judicious, and as they have in various instances been found to answer very completely, a description of them will be considered as a proper addition to this article.

The different instruments used by Dr. Monro, with the several parts of each of them, are represented in Plate LXVIII.

Fig. 9. is a foot sock, or slipper, A, of double quilted ticken; from the heel of which, B, the quilted strap, D, is of such a length as to reach above the calf of the leg.

Fig. 1. A strong quilted calf piece, E, with pye-holes, FF, on each side, through which a lace, fig. 2. is to be passed, and with a buckle, G, so placed on its back part, that when the lacing is on the outside of the leg, the buckle will be in the middle of the lower part. Two rows of pye holes are here represented, one on each side; either of which may be used according to the size of the leg.

In Dr. Monro's case, the foot and leg were first wrapped in soft flannel smoaked with fumes of benzoin, when he put on, as in fig. 3. the foot sock, A, and calf piece, E; and bringing the strap, H, through the buckle, G, he could by it extend the foot, and pull down the calf to what degree might be judged proper, and there it was secured with the buckle.

This bandage answered the intention perfectly well; and it was wore night and day. It should be drawn tighter during sleep, and relaxed when the patient is awake and on his guard: during which the foot should be placed upon a stool, as at I; and the calf piece should be frequently stuffed, or made easier by loosening the lace, so as to prevent the foot from swelling, which is apt to happen if this be omitted. To prevent the toes from becoming uneasy, the foot sock should be left open at the end, K.

During the first fortnight the Doctor made no motion nor effort with his foot, but was carried in a chair,  
running

FIG. 1.

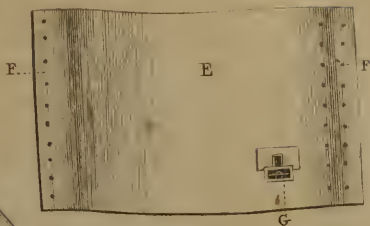


FIG. 2.



FIG.

3.

G

H

FIG.

4.



FIG. 5.

FIG. 6. . FIG. 7.

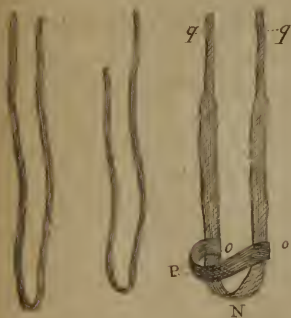


FIG. 8.

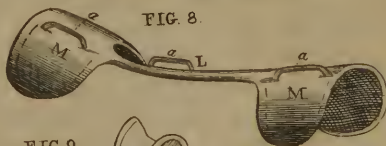
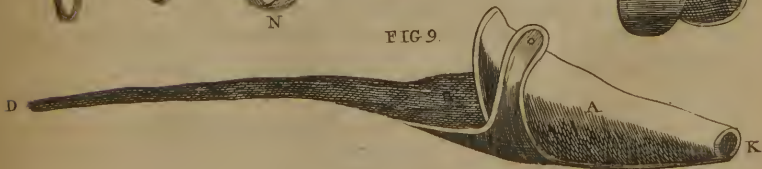


FIG. 9.





running on castors, from one part of his house to another : After this he began to move the foot backwards and forwards, so gently as not to give pain. In a gradual manner these motions were increased ; the extension of the leg and flexion of the foot were always stopped on their producing any uneasiness.

On beginning to walk, the affected leg, which was the left, was always put before the right, so that the left foot might be as well extended as possible. To prevent any danger from falling, a cane was used in the right hand.

The void between the two ends of the divided tendon became insensible in a few days, except that a softness was felt there more than any where else ; but this part turned gradually thicker and harder, till a knot was formed in it of the size of a middle sized plum. At first this tumor was equally hard with a piece of cartilage ; but it gradually became softer, and diminished so much, that at last it was scarcely perceptible.

With a view to strengthen the leg and foot, cold water was poured upon them, and immediately thereafter they were well rubbed. This was first employed some weeks after the accident : but no advantage being derived from it, the parts were afterwards strongly rubbed twice a day with unguentum altheæ, or some other emollient ; and this was continued till the limb could be used with freedom.

In about two weeks from the time of receiving the injury, the Doctor was obliged to go abroad, when he used a pair of shoes with heels two inches high, and applied the machine, which we shall presently describe, through the day, instead of the former bandage ; which, however, was always put on at night for a month longer.

This new machine, fig. 8. is a piece of steel, the middle stalk of which, L, is narrow but strong ; the ends, MM, are thin and concave, and must be adapted to the convexity of the foot and fore part of the leg.

Three staples, *a, a, a*, stand up from the fore part of the steel; one in the middle of each of the broad ends, and the third in the middle of the stalk. All the steel, except the stalk, should be covered with soft leather, and the concavities of *MM* should be well buffed, as the softer rupture bandages commonly are.

After putting on the shoes and stockings, one end of this machine was put upon the broad part of the foot, nearer the toes than the buckle of the shoe, and the other end was placed upon the fore part of the leg; then one ribband, or a thong of leather, fig. 5. was put round the foot, and another, fig. 6. round the leg, to pass through the two staples near the ends of the machine, and there secured with straps or buckles, but without being drawn tight. A third strap or ribband, fig. 7. with its middle, *N*, applied to the hollow of the foot, immediately before the heel, had its ends passed on each side of the foot through a noose, *o o*, of a fourth thong of leather, *P*, that came round the quarter heel of the shoe, to be afterwards put through the middle staple; where, after these ends, *q q*, were drawn as tight as was thought convenient for extending the foot, they were secured with the buckle or with knots. See the application of this machine in fig. 4.

This was continued for the space of five months; but those who may find it inconvenient, might use instead of it a thong of leather, sewed at one end to the upper and middle part of the quarter heel of the shoe, and fastened at the other end to a garter or strap put above the calf of the leg. The high heeled shoes were continued for a considerable time: two years elapsed before they were thrown aside; by which means, and by treating the injured limb during all that period with great caution, a very complete cure was obtained; while others, who have not been so attentive to the management of matters of this kind, have not been so fortunate; some of them having the tendon rup-  
tured

tured a second, or even a third time, and others remaining stiff and lame for a great length of time.

## SECTION VIII.

### *Of Wounds in the Ligaments.*

**B**Y Ligaments, we understand those flexible bodies which serve to cover the different articulations, and by which many of the bones are firmly tied to one another. The bones of the pelvis are united by strong ligaments; and we know, that several other bones are chiefly connected by the same means. But as all these ligaments lie deep, they are not much exposed to the effects of external violence; and the same cause puts it out of our power to apply any particular treatment for injuries which may accidentally be done to them. Our observations at present are therefore chiefly applicable to wounds of the ligaments of joints, commonly termed Capsular Ligaments.

As the ligaments are not so plentifully supplied with nerves as some other parts of the body, several anatomists have been induced to believe that they are not possessed of sensibility; by which we might be led to conclude, that injuries done to them would not probably require much attention: But although Nature, for obvious reasons, has not made the ligaments highly sensible; and although in a healthy state they will bear much fatigue without suffering so much as other parts of the body; yet the fact is undoubted, that they are rendered extremely sensible by disease; and that wounds inflicted on them are frequently productive of very alarming consequences. We have often indeed known the ligaments of joints much injured, nay violently lacerated, by the heads of the bones which they surround being pushed through them, as well as by other causes, without any bad effect being experienced from it; and in some cases the

wounds have healed as easily as if the ligaments had not been affected. These, however, are rare occurrences, and are by no means to be depended upon: for in a great proportion of cases where joints are wounded, the symptoms which ensue are severe and hazardous. Affections of this kind, however, are very deceiving: for in general nothing alarming appears at first, nor for several days after the accident; and when the patient is treated with care and attention, I have known a week pass over before any other symptom has been observed than what usually takes place in the most simple wounds. But, at length, the patient begins to feel an uneasy sensation of stiffness over the affected joint, which by degrees turns more severe; when the parts become swelled, tense, and somewhat inflamed. In this situation the pain is in general so very severe, that the patient cannot allow the joint to be touched: He complains of a tightness round the whole, as if it was firmly tied or girded; and the inflammation, which at first was confined to the joint itself, is now apt to spread over the whole limb.

If the wound or laceration in the capsular ligament is large, the synovia is often discharged in considerable quantities at first; but the swelling induced by the inflammation gradually puts a stop to it, till at last the wound becomes dry and sloughy. In the course of a few days, however, extensive suppurations begin to form over the joint; and on these being laid open, large quantities of pus are discharged, together with synovia. By this the tension and girding pain are immediately removed, and the patient experiences much relief; but successive suppurations often take place, which from time to time excite a renewal of all the symptoms, and by which the patient's health is at last very apt to be much injured.

When wounds in the ligaments do not heal quickly, and almost without the formation of matter, this is in general the manner in which they terminate; at least it is the case in the larger joints, and it is in these chiefly that they ever prove alarming.

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From this history of the rise and progress of the symptoms, some advantage may be derived in conducting the cure. From this it is evident, that it is not merely the injury done to the ligament which we have to dread ; but a secondary train of symptoms, which are very apt to result from it. Although none of the lining membranes of cavities, which are naturally shut up from the air, seem to be endowed with much sensibility, it seems to be a very common effect of air finding access to them to give them an exquisite degree of it. Of this we have frequent proofs in wounds which penetrate the cavities of the thorax and abdomen ; and it is evidently to this cause that we are to attribute those consequences which result from wounds in the capsular ligaments of joints.

This points out a very important circumstance in the treatment of such wounds ; namely, the prevention, as far as is in our power, of air finding access to these cavities. In large lacerated wounds this will, for the most part, be impracticable ; but in common incised wounds, it may often be very completely effected.

It ought never to be attempted, till we are certain that any extraneous body that may have been carried in is extracted. This being accomplished, we may very commonly cover the wound in the capsular ligament entirely, by pulling the skin so far over it, that the wound in the one may not correspond with that in the other ; and as the skin about the joints is sufficiently lax to admit of this, it may always be easily done. We are now to fix the skin in such a manner that it may not retract, either by futures or adhesive plasters : but in general the latter will prove sufficient, if they be assisted by the application of a proper bandage ; and they are preferable to futures, which in this situation are apt to excite inflammation. After the plasters are applied, the skin and cellular substance should be supported in their situation by passing a flannel roller spirally round the joint, so as to produce an equal degree of compression over the whole

whole of it, of a tightness sufficient for supporting the parts to which it is applied without interrupting the circulation. The patient should be in bed while the dressings are applied, so that they may not afterwards be liable to be moved ; and the limb should be put upon a pillow, and placed in such a situation as admits of the skin and other teguments being most completely relaxed, which will be found to be different in different parts even of the same joint. Thus, in treating a wound of this kind in the anterior part of the knee, the leg should be kept extended during the whole progress of the cure ; for in this situation the skin which covers the fore part of the joint is most effectually relaxed ; while, for a similar reason, in penetrating wounds entering from the ham, the leg should be kept bent.

In the mean time, in order to prevent the accession of inflammation, the patient should be put upon a low diet ; his bowels should be kept lax ; a moderate perspiration should be excited ; and he should lose a quantity of blood suited to his age and strength.

By treating wounds of the joints with this strict attention, I have known many of them terminate easily, which might otherwise have been productive of much distress : But when these means do not prove effectual, or when they have been too long neglected, so as that the application of them is no longer admissible, and which will always be the case when inflammation has taken place, other remedies must of course be employed.

In this situation, our principal object is to remove the inflammation ; and if it be not speedily accomplished, it will in all probability spread over the whole joint, when it very commonly terminates in extensive suppurations. Every practitioner will know, that such an occurrence is necessarily attended with much hazard ; so that nothing should be omitted by which it can probably be prevented. The most effectual remedy which I have ever employed, is local blood let-  
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ting ; but, in order to prove useful, it must be carried to a considerable length. In strong robust patients, eighteen or twenty leeches should be applied as near to the part affected as they will bite ; to be repeated daily as long as the continuance of the inflammation may render it necessary. Any of the simple ointments may be applied to the wound itself ; but one of the best applications to the joint is the steams of warm vinegar, which have often appeared to prove useful in preventing the formation of matter. And as the pain in wounds of the joints is in general severe, large doses of opiates must be given to allay it. In a few cases I have known the pain much relieved by the external application of a strong decoction of white popy heads by way of fomentation : but for the most part, nothing proves effectual but the internal use of opium.

By due attention to these means they will commonly prove effectual, if they have not been either too long neglected or too sparingly administered. From either of these causes, however ; from the violence of the injury ; or from some constitutional affection ; the inflammation will, in some cases, still proceed to increase ; and, notwithstanding all our endeavours, will at last terminate in very large collections of matter, which will be partly within the capsular ligament of the joint, partly in the substance of the ligament itself, and in part it will be found to have spread through the cellular substance of the contiguous parts. In such circumstances, all that art can do is to give free vent to any matter that may form ; which can only be done by making an opening in the most depending part of the collections as soon as the existence of pus is ascertained. In this manner, and by proper use of emollient poultices and fomentations whenever a new collection appears to be forming, we will sometimes be able to save limbs, which otherwise it would be necessary to amputate : But whoever has had experience in this branch of practice will know, that when wounds in any of the larger joints terminate in suppuration  
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within the capsular ligaments, that the risk attending them is great ; and that we can never, even under the best management, have any dependence on their terminating favourably. The principal reason, as we have already observed, of their continuing obstinate, is the inflammation becoming violent ; which, when not obviated by the means we have advised, is apt to produce such large collections of matter ; and one abscess is so apt to succeed to another, that the patient is at last exhausted, when we are often under the necessity of removing the limb in order to save his life. In such circumstances, indeed, there is no room to hesitate ; for when the strength is much impaired by the frequent formation of abscesses, if the same disposition continues, and especially if any degree of hectic fever has taken place, the risk attending any attempt to save the limb will now be considerable, while the chance of succeeding will be so small, that it should never be advised.

But although I am decidedly of opinion, in circumstances such as we are considering, that it is the safest course to amputate the limb ; yet I by no means agree with those, who say, that almost every case of a wounded joint requires the same remedy. By many it has been asserted, that wounds in any of the larger joints almost universally terminate so unfavourably, that, in order to save much pain and trouble, as well as risk to the patient, it would be the most advisable practice to amputate immediately after the accident, before there could be any chance of inflammation taking place. I am convinced, however, that this opinion is founded in error ; and my reasons for it are these :

Although it will not often happen that complete cures are obtained where the capsular ligaments of any of the larger joints are extensively wounded, yet in some cases it is otherwise. Of this I have met with different instances : And although such injuries will not often be so effectually cured as to prevent a considerable degree of stiffness and immobility in the joints

joints in which they are seated; yet even a complete anchylosis is an inconvenience to which a patient should submit, rather than to the pain and hazard which uniformly attend the amputation of any of the extremities.

As it must be admitted, however, that the proportion of limbs which are saved by this practice, is extremely small when the injury done to the capsular ligaments of joints are extensive, this argument would not deserve our attention, if the delays which it occasions were to be attended with any additional hazard, or if it should preclude amputation, if at any future period of the sore it might be judged adviseable. This indeed, has been alleged by practitioners: but there is much cause to suspect that they are wrong; for many who have been accustomed to amputate in the late stages of such sores, have had more success than generally attends the practice when advised immediately after the injury is inflicted. And this, in the course of my experience, has been so uniformly the case, that scarcely any have died who were not previously so very much reduced as to render their chance of recovering very small indeed; a situation which we have it always in our power to guard against, by advising the measure before matters are so far advanced.

Where the capsular ligament of a joint has not only been wounded, but much lacerated and contused, it may in a few cases be proper to advise immediate amputation. But such instances are extremely rare: so much so indeed, that I have never met with any, excepting where the ends of bones have been perhaps much broke, and even splintered at the same time. Where this has not been the case, I have uniformly been in the practice of attempting to save the limb; and as in several instances I have succeeded, without adding to the risk of the patient where the trials have failed, I shall certainly think it right to continue it.

## SECTION IX.

*Of Wounds in the Face.*

**I**N the second volume of this Work, we entered into a full consideration of wounds of the head, which either primarily or eventually may affect the brain: and in it, and in this volume, we treated of the Diseases of the Eyes, Nose, and Mouth; we shall now therefore refer to what was then said upon these parts of our subject.

In the treatment of wounds in any part of the face, one important object is to prevent deformity. This is indeed, an object in every part of the body; but in the face it is so essential, that the slightest injuries done to it require particular attention.

As every cicatrix produces some degree of deformity, we should endeavour in every wound of the face, to have the divided parts laid as exactly and neatly together as possible, and to retain them by those means, which will be productive of the least mark. In all superficial wounds of the face, as well as in those which run deep, when of a longitudinal direction with respect to the fibres of the injured part, we should trust to adhesive plasters alone for retaining them. But wherever the edges of a wound retract much from each other, as we will not be able in any other manner to retain them, futures ought without hesitation to be employed; and of these the twisted future, described in Chap. I. Sect. V. Vol. I. ought in general to be preferred; for it prevents retraction with more certainty than the others, at the same time that it is not productive of more pain or uneasiness. In this manner it is more especially necessary to treat all wounds of the lips, which cannot indeed in any other way be prevented from leaving much deformity; we shall refer, however, to Chapter XXIX. Section I. for what

was farther said upon this point, when treating of the operation for the Hare Lip.

Wounds in the cheeks are apt to penetrate the salivary ducts leading from the parotid glands; and as this is frequently productive of much inconvenience, by the divided duct continuing to pour out the saliva long after the rest of the wound is healed, it becomes an important object in many instances to accomplish a cure. But as we entered into a particular consideration of this point in Chap. XXX. Sect. XIV. we must now refer to what was then said upon it.

In the forehead, wounds are sometimes attended with hemorrhagies, which prove troublesome from our not being able in the usual manner to apply ligatures upon the arteries from whence the blood is discharged, owing to their running in a groove of bone; which is the case with a small branch which passes out on each side from the internal carotid immediately above the eye brows. In all such cases, we should, in the first place, employ sponge, agarie, or any mild astringent, along with gentle compression; and when this fails, we may endeavour to pull out the bleeding vessel by means of the tenaculum, and in this manner may tie it with a ligature. I once succeeded in this way with perfect ease, when every other method had been tried in vain.

It may sometimes happen, however, even that this will fail. In such cases, when the hemorrhagy continues so profuse as to endanger the patient, it may be proper even to remove that portion of the skull in which the vessel is incased; or, in the hands of a nice operator, the intention may be answered by taking away the outer table of the skull only: for, in some cases, these arteries run for a considerable space between the two lamina of the bone; and in such instances our object may be accomplished by the removal of one of them; and thus the risk of exposing the brain will be avoided.

SECTION.

## SECTION X.

*Of Wounds in the Trachea and Oesophagus.*

IT is necessary in some cases to make openings into the trachea and oesophagus, for allowing food and air to pass to the stomach and lungs when these passages are obstructed. We must refer, however, for the method of effecting this, to Chapters XXIII. and XXIV. where these operations are particularly described: At present we are to consider the method of treating wounds in the trachea and oesophagus, inflicted in some cases by accident, but more frequently by design; as often happens where suicide is attempted.

The trachea is seldom divided longitudinally. Transverse wounds running between two of the cartilages, of which it is composed, are more frequent. In some cases these wounds are superficial, and only penetrate the anterior part of the tube; in others, they run so deep as to divide it entirely.

In all longitudinal wounds of the trachea, a cure may be obtained by the use of adhesive plasters alone: The lips of the wound will be easily brought together; and as the retraction will never be considerable, a proper application of adhesive plaster will prove sufficient for retaining them. In such cases, therefore, they should be preferred to sutures; and bandages are here inadmissible, as they cannot be applied with such tightness as to have any effect upon the wound, without compressing the trachea so much as to impede respiration.

Even in slight transverse wounds of this part, a cure may often be effected with adhesive plasters; and this especially, if they be assisted by a proper posture of the head, which in every wound of this nature should be kept as much as possible bent down upon the breast. Indeed, if this be not duly attended to, it will often be impossible to produce a right reunion of the divided parts

parts either with plasters or any other means : It ought not therefore to be left in the power of the patient. The head should be fixed with a bandage ; and the most simple, as well as the most effectual, method of doing it, is by putting a common night cap upon the head, and a piece of broad tape or ribbon being sewed on each side of it above the ear, it may now be pulled down and fixed as low as is necessary, by tying the tapes to a circular roller put round the chest. In this situation the head should be kept for several days, till there is reason to imagine that the parts are firmly united.

But in transverse wounds of the trachea, which penetrate deep, we should not trust to adhesive plasters ; the interrupted future made with broad ligatures will answer better. I am doubtful, however, if the ligatures should ever be passed into the trachea, as some have advised ; for the irritation and cough which they excite is very apt to do mischief by tearing asunder the very parts they are meant to unite ; at least this has been the case in two instances where I have known this method practised. A troublesome cough was induced in each of them ; the stitches were tore out ; and much perplexity was thus given both to the patient and surgeon.

Instead of passing the ligatures round any of the cartilages of the trachea, and thus carrying them into the cavity of the tube, I have in different instances succeeded merely by external stitches done in the following manner : The surgeon being provided with a number of needles and ligatures according to the extent of the wound, and the patient being properly placed, one of the needles should be inserted at one side of the wound, and being passed slowly up for the space of an inch between the trachea and skin, so as to include all the cellular substance and muscular fibres which lie between them ; it is now to be pushed out along with one end of the ligature ; and the other extremity of the thread being likewise armed with a needle,

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must in like manner be passed through the teguments of the opposite side. None of the ligatures should be tied till they are all introduced; when this is done, and the divided edges of the cut are properly supported by an assistant, they should be secured with running knots, so as to admit of their being easily untied if this should be found necessary; adhesive plasters should be applied over the whole; and the head should be firmly secured in the manner we have mentioned.

In passing the ligatures, care should be taken to run the needles as close to the cartilages of the trachea as possible, so as to include whatever may afford them any support: For which purpose flat needles should be employed, with a slight degree of curvature, as is represented in Plate II. fig. 5.

Whether or not this method will succeed where the trachea is completely divided, I cannot as yet determine, having had no opportunity in such a case of putting it in practice: but as it has succeeded where all the anterior part of the tube was divided, there is reason to imagine that it would not often fail. At any rate, it should always be proposed in the first place; for even when it does not succeed, we are not prevented from employing other means of relief. In such instances we are reduced to the necessity of passing the ligatures round one or more of the cartilages of the trachea, which, with a curved needle, may be easily done: Care should be taken, however, to enter both ends of the ligature from the inside of the trachea, when by pushing the point of the needle outward, all risk of doing mischief will be avoided.

To give the practice as much chance as possible of succeeding, there should be as many ligatures introduced as may seem in any degree necessary for retaining the divided ends of the trachea together: In general, three stitches will be found sufficient; one in the middle of the prominent part of the trachea, and another

nother on each side, towards the extremities of the cartilaginous rings.

Wounds of the oesophagus are to be managed nearly in the same manner with wounds in the trachea: but they are more dangerous, on account of the difficulty of reaching the oesophagus from its deep situation; from the under part of it, when entirely separated from the rest, being apt to fall altogether within the sternum; and from the difficulty of supporting the patient with proper nourishment.

These wounds are likewise to be considered as dangerous, from their vicinity to large arteries and nerves. If the recurrent nerves are divided, the voice may be much impaired; and if any of the large branches of the carotid arteries are wounded, the patient may die from loss of blood before assistance is procured.

In wounds of the trachea and oesophagus, our first object should be to put a stop to the hemorrhagy, not only to prevent the loss of blood, but to obviate the cough and sickness, which greatly aggravate the injury, and which are the consequence of blood finding access to the stomach and lungs. Every vessel therefore, that pours out blood, whether artery or vein, should be immediately tied with a ligature. When the wound is not extensive, but is confined nearly to the boundaries of the trachea and oesophagus, the artery which goes to the thyroid gland will probably be the largest vessel that is cut; for it is commonly in this situation, immediately below the thyroid cartilage, that attempts are made upon the throat. But in wounds of greater extent, the jugular veins, and even the carotid arteries, are sometimes divided. For the most part, a wound in either of these arteries proves immediately fatal; but when one of the carotids is only partially hurt, there may be a possibility of saving the patient by securing the bleeding vessel with a ligature both above and below the cut: at least, it should always be attempted; and it is probable when one artery only is cut, that the attempt

would succeed. There is no reason to doubt of its proving successful in wounds of the jugular veins: but where these veins are only wounded, without being cut entirely across, we may with propriety endeavour to effect a cure by compression. When slight compression only is necessary, it may be accomplished by a circular roller put round the neck; but when any considerable degree of pressure is required, as this cannot be employed without impeding respiration, we are under the necessity of using a machine for protecting the trachea. In Plate LXIX. an instrument is delineated, which answers this purpose very effectually.

As soon as the hemorrhagy is stopped, we should proceed to unite those parts of the oesophagus which have been divided; and in doing it, if the wound be not very extensive, it will be of much importance, both to the operator and patient, to have it enlarged in every direction that may be necessary for bringing the injured parts easily and completely into view, by which the ligatures will be introduced with much more exactness than can otherwise be done. In passing the threads, the needles should be entered from within, and pushed outwards, in the manner we directed for wounds of the trachea: and in both cases, the ends of them should be left of a sufficient length to admit of their hanging freely out of the external wound in the teguments. The interrupted suture appears to be best adapted for this operation.

In longitudinal wounds of the oesophagus, there is reason to imagine, from the result of different cases, that cures might frequently be accomplished without the assistance of ligatures. But in transverse wounds of this part, it is the safest practice to employ one or more stitches, according to the extent of the injury, by which the food will be prevented from escaping during the cure, and by which a reunion of the divided parts will be more readily accomplished.

#### SECTION





## SECTION XI.

*Of Wounds in the Thorax.*§ 1. *General Remarks on Wounds in the Thorax.*

**T**O the consideration of wounds of the Thorax, it will be proper to premise a short account of the boundaries of this cavity and of the viscera which it contains.

The Thorax is an extensive cavity, of an irregular oval figure, bounded anteriorly by the sternum, laterally by the ribs, behind by the vertebræ of the back, above by the clavicles, and below by the diaphragm, a firm muscular expansion, which serves as a partition between it and the cavity of the abdomen.

The diaphragm does not pass in a direct line from one side of the chest to the other; on the contrary, it falls considerably lower in some parts than in others, by which the extent of this cavity is in different parts very unequal. On cutting the thorax directly across about the middle of the sternum, and looking down upon the diaphragm, we find it round and prominent about the middle, with its edges stretching down to its several attachments. In its highest and most anterior point, it is fixed to the cartilago ensiformis; from whence it descends obliquely, and is attached as it goes along to the seventh, eighth, and all the inferior ribs: while, behind, it is fixed to the upper vertebræ of the loins. From this it is evident, that the back part of the thorax is much more deep and capacious than the anterior part of it: a point with which practitioners should be very exactly acquainted, otherwise their ideas of wounds in these parts will often be very erroneous. Thus, without this information, we would be apt to imagine that no injury would be done to the lungs by wounds running directly across

the body, after entering any part of the cavity of the abdomen : whereas it is certain, that no instrument can pass in this direction even at the distance of several inches beneath the upper part of the abdomen, without penetrating the cavity of the thorax ; and, for the same reason, all wounds which pass directly across the body from the inferior and back part of the thorax, must necessarily pass through the abdomen.

The whole cavity of the thorax is lined by a firm membrane termed the *Pleura*, which adheres every where to the sternum, to the ribs, intercostal muscles, and diaphragm. Each side of the chest has a distinct pleura ; which uniting together near the middle of the breast, and running transversely from the sternum to the vertebræ, form two cavities which have no communication with each other. This membranous partition is termed the *Mediastinum*. It adheres firmly, as one membrane, to the sternum through its whole length ; but the two *pluræ* recede from each other near to the vertebræ, to admit of a passage for the aorta and oesophagus. The heart, inclosed in the pericardium, occupies a considerable part of the left cavity of the thorax : the rest of this division, with all the right side of the chest, is chiefly filled with the lungs. The only other parts lodged in the thorax are, the aorta, oesophagus, the thoracic duct, thymus, and large blood vessels about the heart. In a state of health, the lungs do not adhere to the pleura ; but it often happens, after inflammatory affections of these parts, that very firm and extensive adhesions take place between them.

The thorax is exposed to all the variety of wounds ; but the chief distinction we have to attend to, is that which takes place from their degree of depth. Superficial wounds, which do not run deeper than the common teguments, if they are rightly treated, will seldom be productive of any important consequences ; while even the slightest injury which penetrates the chest will, in some instances, be attended with the most alarming

larming symptoms ; and these again will be of a more dangerous nature when any of the viscera lodged in the thorax are wounded.

Wounds of the thorax may therefore be divided into three kinds : Those which affect the common teguments only ; such as merely penetrate the cavity without doing any further injury ; and those by which some of the viscera are likewise hurt.

Our first object in wounds of this kind is, to discover whether they have penetrated the cavity of the chest or not ; which in general we may do by attending to the following circumstances : By the patient being put into that situation in which the wound was inflicted, and in this state making a particular examination with the fingers, or probe, of the direction and depth of the wound ; by the form of the instrument, and the length to which it seemed to be pushed ; by any mild liquid which may be injected returning immediately or lodging in the wound ; by air being discharged in considerable quantities during respiration ; by an emphysematous swelling appearing over the contiguous teguments ; by the quantity of blood discharged from the wound being considerable or otherwise ; by the appearance of the blood ; by blood being discharged from the mouth ; and by the state of the pulse and respiration.

Each of these circumstances we shall consider in the order they are mentioned.

It is obvious that it is of importance to pay attention to the posture of the patient during the examination of every wound ; but it is in none more so than in wounds of the thorax, where, from the variety of muscles which may be injured, and from the mobility of the ribs, wounds may in one posture appear to be quite superficial, which in others are found to penetrate to a great depth ; for if any part of a rib, of a muscle, or even of the cellular substance, be forced by the posture of the patient into the course of a wound, neither the finger, probe, nor injections, will pass with that ease

which the free examination of such injuries requires. In all such cases, therefore, before we proceed to examine the direction and depth of the wound, the patient should be placed as nearly as possible in the posture he was in at the time of receiving it.

In some cases, the opening is so large, that we distinguish with the eye whether a wound has penetrated to the depth of the cavity or not ; or we introduce one of the fingers, which is better than any probe when it can be passed forward without lacerating the contiguous parts : But when the opening is too small to admit of this, we are under the necessity of using a probe ; and the best substance for this purpose is a common bougie. When we mean by probing a sore to discover whether there is any extraneous body lodged or not, or whether the bones beneath are carious or in a sound state, a metallic probe is to be preferred : but for examining the depth and direction of a wound, nothing answers so well as a firm and tolerably thick bougie ; which neither gives so much pain to the patient, nor is it so apt to be pushed beyond the depth of the wound into the contiguous soft parts, as the common small probe when used with freedom. This will not often indeed occur with practitioners of experience, as they will not only use this instrument in every case with caution, but will be sensible that it is often unnecessarily employed : For even in wounds of the thorax, we should not search for their depth with too much anxiety ; as, by doing so, more harm may be done than could be compensated by any advantage to be derived from the discovery. It is highly proper to examine, in a cautious way, into the direction and depth of such wounds ; but the younger part of the profession should know, that much harm has been done by researches of this kind being carried too far : and they should likewise know, that it is perhaps of more importance to be acquainted with the direction of an external punctured wound, which does not run deeper than the cellular substance above the ribs, or perhaps

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to the intercostal muscles, than to know, by means of the probe, whether a wound reaches to the cavity of the chest or not : for even where we find, in the most evident manner, that a wound goes to the depth of this cavity, if no bad symptoms occur, little or no advantage is obtained from the discovery ; and where such symptoms take place as are known to proceed from a penetrating wound, and of which we shall afterwards treat, we are thus rendered equally certain of the nature of the case as if a probe had passed easily into the thorax.

Some advantage may be procured in inquiries of this kind, from our attending to the size and figure of the instrument ; the direction it seemed to take ; and the depth to which it was pushed : These are points of which we cannot always receive exact information ; but it is sometimes otherwise, particularly in duels, where a surgeon is frequently attending, and where the bystanders are often so much interested as to be able to give distinct intelligence upon this and every other point of importance.

When we are rendered certain, by either of these modes of inquiry, of the depth of a wound, it would be unnecessary as well as improper to carry our researches farther : but when the point remains in doubt, it may be sometimes determined by throwing in injections of any mild liquid. If the liquor returns immediately, there will be reason to conclude that the wound is superficial, or at least that it does not pass into the thorax ; but when it lodges either altogether, or in any considerable part, without raising any outward tumefaction, there will be no cause to doubt of its having reached the cavity. In throwing in liquids for this purpose, either the common syringe, Plate LXIV. fig. 4. may be employed, or a bag of the elastic gum, mounted with a pipe as in Plate XXIX. fig. 3. but it should never be done with much force, as in this manner parts might be torn asunder which were not previously hurt ; and the mildest liquor only  
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should be used, as it might prove dangerous to apply any thing possessed of stimulating powers to the surface of an irritable part. Honey and water are commonly used for this purpose ; but warm water alone is less irritating, and should therefore be preferred.

When air is discharged by the wound during inspiration there will be cause to suspect that the lungs are wounded. But although this is usually considered as one of the most certain proofs of a wound having penetrated the chest, yet it is proper to remark, that it is far from being decisive. Wherever the lungs adhere to the pleura, a wound may penetrate to a considerable depth ; nay, it may pass entirely across the body, without entering what is properly termed the Cavity of the Chest ; and we know that air is frequently discharged at wounds in the thorax where there is no reason to suspect that the lungs are hurt ; for when no adhesions take place between the pleura and lungs, the external air, if it gets access by a penetrating wound, will pass between them, and will necessarily be forced out at every inspiration ; a circumstance which invalidates the certainty of this test. In judging, therefore, of the weight which is due to it, we should, in the first place, cause the patient to make several full inspirations, in order to discharge any of the external air that may be collected ; and at the end of each, the contiguous skin should be so drawn over the wound, as to prevent any more from finding access. In this manner the whole will soon be evacuated ; when, if we still find that air rushes out during inspiration, we may with certainty conclude that the lungs are injured.

Emphysematous swellings sometimes appear in consequence of wounds of the thorax, by the air from the lungs finding access to the surrounding cellular membrane. This, however, will seldom happen in extensive wounds ; as in these the air from the lungs will readily be discharged outwardly : but it is by no means unfrequent in punctured wounds, especially in  
such

such as have an oblique direction. It is obvious, however, that although this is a certain proof of the lungs being injured, that it may sometimes happen without any communication with the cavity of the chest, for the reason mentioned in the last paragraph.

When the quantity of blood discharged from these wounds is considerable, we may with much certainty conclude, that they have not merely passed into the chest, but that some of the contained viscera are wounded; for, excepting the intercostal arteries, which run upon the inferior border of each rib, all the other blood vessels of the external parts are here very small: and as we can by compression easily put a stop to hemorrhagies from the intercostal vessels, we may in almost every instance discover immediately whether the blood be evacuated from the chest or not.

Even the appearance of blood discharged from these wounds may lead to a knowledge of their depth. It is a known fact, that blood coming directly from a wound in the lungs, has a more red, and particularly a more frothy appearance, than blood from any other part, owing probably to its being mixed with the air in the bronchiæ; so that when blood assumes this appearance, we have much cause to conclude that the lungs are injured.

When blood is spit up by the mouth immediately after a wound in the thorax, there will be no reason to doubt of the lungs being hurt. For although we ought not to conclude from the absence of this symptom, that the lungs have not suffered, as they are often wounded without any blood being discharged by the mouth; yet we may be convinced, that some injury is done to them when blood is actually discharged from them.

In our inquiries into the nature of such wounds, the state of the pulse and of respiration should be particularly attended to. In wounds which do not penetrate deeper than the common teguments, neither the pulse nor breathing are at first affected, nor do they produce

duce any other consequences for the first two or three days than wounds in any other part of the body : but wounds which go to the depth of the thoracic cavity, and more especially when they affect the lungs or any other parts contained in it, may often be distinguished by their producing an immediate effect both upon the pulse and breathing. When the lungs are injured in a part where they adhere to the pleura, the wound may pass to a considerable depth without any extravasation taking place into the cavity of the chest ; in which case no immediate effect may ensue : but when either blood or air finds access to this cavity, the lungs are immediately compressed, by which the breathing becomes difficult, and the pulse feeble, oppressed and intermitting ; so that when these symptoms take place, we may at once give a decided opinion of the nature of the case.

By due attention to these circumstances, we may, in almost every case of this kind, determine with much certainty whether a wound has reached the cavity of the thorax or not : and this being fixed, we are next to proceed to the method of treatment. We shall first attend to those wounds which do not go deeper than the common teguments or muscles, and shall afterwards treat of such as penetrate deeper.

## § 2. *Of Wounds in the external Teguments of the Thorax.*

When wounds of the thorax do not go deeper than the skin and cellular substance they do not give any cause for anxiety, as they heal with the same ease, and are to be treated in the same way, with similar wounds in other parts of the body : but when they reach the muscular substance between the ribs, and especially when they run among these parts for a considerable way like sinuses, there is always reason to fear that at last they may penetrate the cavity of the thorax ; for when sores in this situation are not in every respect properly treated, and if any matter that forms in them  
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be not regularly discharged, it is very apt to pass deeper and deeper, till at last it makes its way through the pleura itself. In all such cases, therefore, it should be the first object with practitioners to give a free vent to the matter. In open incised wounds, all that is necessary is, by means of soft easy dressings, to preserve their lips or edges from adhering till they fill with granulations from the bottom : but punctured wounds should either be laid open through their whole extent, or a seton should be passed from one end of the sinus to the other. When they are not very extensive, the shortest and easiest method is to lay them freely open with a scalpel and director, and then to heal them from the bottom like incised wounds from any other cause : but when a puncture runs to any considerable length, the method of cure by a seton answers better. By passing a seton along the course of the sinus, it is not allowed to heal outwardly till the whole be equally filled up ; and this being accomplished, if the cord be gradually diminished, when it is at last removed, a moderate degree of pressure continued upon the parts for a few days longer, will seldom fail to effect a cure. Some, indeed, advise us to attempt the cure of all such sores with pressure alone. But although this practice will often prove successful in other parts of the body, particularly in the extremities, where pressure can be applied with exactness along the whole course of a sinus, and be continued for a sufficient length of time without risk ; yet in wounds of the thorax, the same advantages are not to be expected from it : for here the constant motion of the ribs prevents us from applying a continued equal pressure without impeding respiration in a very disagreeable manner. When a cure is to be attempted by pressure alone, it must be done with a roller passed firmly round the thorax, supported by what is termed a Scapulary, put over the shoulders : But when a seton has been previously used, any pressure that is necessary may be applied with slips  
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of adhesive plaster laid along the course of the wound, and fixed upon the contiguous skin.

This method of cure, by laying the sinuses open, or by the insertion of a seton, to those not much versant in this branch of practice, may appear to be unnecessarily severe ; for in many of the older writers we are told, that our object may be accomplished in a much more easy manner, namely, by keeping the external openings of the sores pervious by the use of tents till they are firmly healed from the bottom. In wounds which penetrate to the cavity of the thorax, tents, especially those of the hollow kind, prove often useful ; and as they may be used with perfect safety, they should not be so generally condemned as some modern practitioners have affected to do. But in punctured wounds which do not go to this depth, as our great object is to avoid every risk of the matter finding access to the thorax, whatever can tend to impede the discharge of it, should by all means be avoided. So that in such cases tents should never be used ; they would frequently do much mischief in the manner we have mentioned ; in many cases they would fail entirely ; and if they should ever succeed, the cure would prove much more tedious, and often more painful, than the mode of treatment we have advised.

In every wound of any importance, it is proper to pay particular attention to the regimen of the patient ; a point upon which the event of the case very often depends : For we frequently observe injuries of this kind treated in every other respect with propriety ; and yet the practitioner fails, from the patient being allowed too much freedom in food, drink, and exercise. In wounds of the thorax, attention to these points is still more necessary than in similar affections of any other part : for as the contained parts are highly necessary to life, and as they are very liable to inflammation, even from injuries that do not penetrate deep, every precaution should be employed that can probably tend to prevent it. Hence, for several days

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at least, or even till there does not appear to be any farther chance of the parts becoming inflamed, the patient should be kept upon a low, cooling diet ; animal food and strong liquors of every kind should be avoided ; the bowels should be kept open with mild laxatives ; and when the pulse requires it, a due proportion of blood should be evacuated. Rest of body and perfect quietness is of much importance in these wounds ; for they are affected by the least degree of motion ; even coughing, laughing, or much speaking, is apt to hurt them, and should therefore be as much as possible avoided.

§ 3. *Of Wounds which penetrate the cavity of the Thorax.*

Wounds penetrating the thorax are always to be considered as hazardous, and therefore merit the utmost attention : Even such as merely penetrate the chest are often attended with the most important consequences ; but the contiguity of the lungs and other viscera adds much to the danger. At present, we are to treat of simple penetrating wounds, not connected with any injury done to the contained parts.

It is now known, that in a state of health the lungs fill the spaces allotted for them in the two sides of the thorax so completely, that they are every where in contact with the pleura both in the state of inspiration and expiration : And it is also known, that great distress in breathing is induced by air, blood, or any extraneous matter being admitted between them. Now, in penetrating wounds of the thorax, excepting where the lungs morbidly adhere to the pleura, and which we do not here suppose to be the case, it is scarcely possible to prevent both air and blood from being admitted : The external air rushing in at the wound soon spreads over the whole corresponding cavity ; and when the intercostal artery or any other blood vessel is divided, if the external opening be not sufficiently large, any blood that is evacuated

ated is very apt to fall down between the pleura and lungs to the very bottom of the chest ; by which difficulty of breathing immediately takes place, along with all the other symptoms which usually attend a compressed state of the lungs.

In Chapter XXII. we have entered into a full consideration, not only of the symptoms induced by the collection of fluids in the chest, but of the method of relieving them by the operation of the paracentesis : To avoid repetitions, we shall now refer to what was then said upon this part of our subject, and at present shall offer a few observations upon the means of preventing such collections as may require the assistance of that operation.

In wounds which do not penetrate to the depth of any of the viscera, but which merely pierce the pleura, almost the only artery which can be cut that can afford any quantity of blood, is the intercostal ; and as it is of a considerable size, no time should be lost in securing it whenever it is found to be wounded. As it runs in a groove in the inferior edge of the rib, it is difficult to put a ligature about it ; but with attention this may always be accomplished.

In free incised wounds, the bleeding orifice will be brought clearly into view ; but in small punctured wounds, as the artery cannot be distinctly seen, there is a necessity for laying the parts sufficiently open with the scalpel. When the artery is thus laid bare, various means have been proposed for securing it. For the reason just mentioned, a crooked needle cannot be passed round it. We are therefore told by some, that the only method of doing it is to pass a firm broad ligature altogether round the rib, and by means of it to tie a dossil of lint upon the orifice in the artery : While others condemn this practice, from the injury which it must necessarily do to the pleura ; for this membrane can scarcely be separated from the rib, so as not to be included in the ligature ; and different instruments have therefore been proposed for obviating this inconveniency.

inconveniency. The intention of all of them is to compress the intercostal artery, without hurting the pleura ; but as none of them I have met with answer this purpose, I do not think it necessary to delineate them : those who wish to see them may look into the second volume of Memoirs of the Royal Academy of Surgery at Paris.

It is luckily, however, in our power to secure this artery in a much more simple manner. By dilating the wound sufficiently, we may with a tenaculum; somewhat more bent at the point than usual, draw the bleeding vessel out of its groove, so as to tie it in the ordinary way ; at least in thin people it may be easily done : and where it is found either from the ribs being deeply covered with fat, or from any other cause, that it cannot be secured in this manner, it may always be done in the manner we have mentioned, by passing a firm broad ligature round the rib, and by means of it tying a small doffel of lint upon the bleeding artery. In this way a portion of the pleura will no doubt be included in the ligature ; but it does not appear from experience, that this is productive of any thing bad ; and with sufficient caution we may always with certainty avoid the lungs. When the lungs do not adhere to the pleura, they collapse in some degree immediately on the external air finding access through the wound to the cavity of the chest. And even when they do adhere, we may easily separate as much of them with the point of the finger as will admit of the passage of the ligature.

When a practitioner is called immediately, he may in this manner prevent any quantity of blood from being emptied into the thorax ; and as soon as the hemorrhagy is stopped, he should endeavour to expel all the air that has found access by the wound to the surface of the lungs ; for till this is accomplished, the breathing will remain oppressed, nor will the patient be able to bear the application of the necessary dressings. In the chapter above alluded to, we have mentioned

different methods of expelling air from the surface of the lungs ; but the simplest and easiest is this : While the wound yet remains open, let the patient, in a slow gradual manner, make a full inspiration, by which a considerable part of the collected air will be discharged. This being done, the skin must be instantly drawn over the sore, so as to cover it completely during expiration ; and if the wound be moderately opened during inspiration, the whole quantity will thus be soon expelled. After which, the lips of the wound should be drawn exactly together, and in this situation should be secured by different slips of adhesive plaster, care being taken to support the whole by a proper application of the napkin and scapulary bandage.

In this manner wounds of the thorax will frequently heal, which, if left to themselves, or if treated in the usual way by allowing them to remain open, might be productive of much distress. But in some cases, either from a considerable quantity of blood having been thrown out from the intercostal artery before the ligature was applied ; from the oozing of blood from the smaller ramifications of the intercostal arteries ; or perhaps from a subsequent formation of pus ; oppressed breathing will supervene, notwithstanding all that can be done to prevent it.

When this takes place as a consequence of a wound in the chest, from the formation of matter, an opening should be made to discharge it in the manner we have advised in the chapter on Empyema ; and in this case the opening should be made in the most depending part of the thorax. But when it occurs immediately after a wound, and while the blood yet remains in a fluid state, we may often be able to discharge it at the wound itself : and when this can be done, it should always be preferred ; for we are not to imagine that the thorax can in any part be laid open without some risk of harm being done by it. When symptoms, however, of oppressed breathing occur from a wound in the upper part of the thorax, as we will not be able to discharge

charge the blood by it, we are under the necessity of making a perforation in the under part of the chest as soon as they become in any degree formidable. It is proper, however, to observe, that this operation should never be advised while the symptoms are moderate : for we have daily instances of small quantities, not only of blood but of other fluids, being absorbed ; and as the risk attending a perforation in this place is probably greater than that which occurs from small quantities of blood being allowed to remain, it should not be attempted as long as the breathing continues tolerably free.

#### § 4. *Of Wounds of the Lungs.*

We have already, in the course of this section, enumerated the symptoms which indicate a wound in the thorax to have penetrated the lungs. And although the danger in this case is greater than in wounds which merely penetrate the pleura, yet the method of cure suited to the one is so nearly the same with what we have advised for the other, that it is scarcely necessary to enlarge farther upon it.

It is proper, however, to observe, that as the risk attending wounds in the lungs is considerable, the caution with which they are treated should be proportionally great. Instances indeed have occurred of their healing with ease and safety ; but these are so rare, that we do not hesitate in saying, that every injury done to them is to be considered as hazardous.

The danger which attends them originates, in the first place, from the hemorrhagy being apt to proceed farther than the strength of the patient will bear ; and, afterwards, from abscesses forming in the lungs, which are apt to terminate in pthifical affections.

The hemorrhagy is most readily checked by plentiful venesection, which in such cases should at once be carried so far as to induce fainting ; by the patient being kept in a cool apartment and at perfect rest ; by the use of cooling laxative medicines ; and by a low

regimen. Besides rest of body, it is of the utmost importance to keep the lungs as free from action as possible. Hence coughing, laughing, and even much speaking or deep inspirations, should be rigidly guarded against. Attention to this point is necessary in every wound of the thorax, but it is more particularly so in those which affect the lungs; for when this viscus is wounded, it can never be fully distended with air without stretching every blood vessel that has been hurt.

Notwithstanding, however, of our utmost attention, the patient will sometimes sink under the loss of blood; in other cases, blood will be collected in considerable quantities betwixt the pleura and lungs, so as to impede respiration; or abscesses will form, as we have observed above, in the substance of the lungs.

We have already considered the method of treatment in collections of blood seated between the pleura and lungs: at present we shall offer a few remarks on the management of abscesses in the lungs.

Matter collected in the substance of the lungs from a wound, may be discharged in three different ways. It may be spit up by the mouth; it may be discharged by the abscess bursting into the wound itself; or it may be emptied into one or other of the cavities of the chest between the lungs and pleura.

When an abscess in this situation opens into the bronchiæ, there may often be some risk at first of immediate suffocation; but when this danger is over, by a considerable quantity of the matter being discharged, if there is no constitutional or hereditary pthical tendency, a cure will often be accomplished by the means usually advised in such cases, namely, by a diet that is light and of easy digestion, and at the same time sufficiently nourishing; and by daily moderate exercise, by which any matter collected in such abscesses is brought up with more ease than by any other means. A sea voyage too answers particularly well for this purpose, at the same time that it tends to brace and invigorate

orate the constitution ; but when this cannot be obtained, we advise riding on horseback. When pus collected in the lungs is discharged in this manner, the business of a surgeon becomes altogether unnecessary ; but when the abscess either empties itself into one of the cavities of the chest, or points outwardly at the wound, we have it often in our power to save the patient by an operation, when otherwise he would inevitably die.

When an abscess bursts into one of the cavities of the chest, the matter should be discharged in the manner we have mentioned in the XXIII<sup>d</sup>. Chapter, above alluded to : But when the wound by which the collection is produced remains open, so as to admit of the matter to point towards it, as soon as this is discovered, either by a small oozing of pus taking place, or by the introduction of the finger between two of the ribs, we should at once determine on treating it on the same principles and in the same manner with abscesses in any other part of the body, namely, by making an opening into it of a sufficient size for discharging the matter. The delicate nature of the part in which the matter is seated may be a means of deterring some from adopting this practice ; but it does not require much argument to show, that a patient in such circumstances runs much more risk of suffering by the matter being allowed to remain, than by making an opening into the abscess. By the last measure he avoids the hazard of immediate death, which often happens from large abscesses bursting into the bronchiæ ; at the same time that it prevents the matter from passing into the cavity of the chest, between the pleura and surface of the lungs ; and thus obviates the necessity of a second operation. Nay, in cases of this perilous nature, I would even go farther : When from a previous discharge of matter we are certain that an abscess has formed in the lungs, as a consequence of a wound ; when a stoppage of this discharge takes place, and is succeeded by all the usual symptoms of a fresh collec-

tion of matter, such as an increased difficulty in breathing ; difficulty in lying on the sound side ; frequent shivering fits ; and a hectic pulse ; as in such a situation there will be no reason to doubt of matter being collected, and as the patient must remain in the utmost hazard till it be discharged, I should think it advisable to enlarge the external wound not only of the common teguments, but of the intercostal muscles, and to extend the opening for the space of two or three inches ; by which more freedom will be given for searching with the finger for the seat of the abscess : and whenever it is discovered, I would not hesitate, at whatever depth it may be, to open it, by running a bistoury along the finger, and pushing it slowly into it. In the course of my own experience I have had two cases of this kind ; in which, by this decisive practice, I had the satisfaction of saving two lives, which otherwise must in all probability have been lost. This was the opinion of other practitioners who attended along with me ; and I was so much convinced, in both cases, of matter being collected internally which produced the danger, and of nothing being able to save the patient but the discharge of it, that after warning the patient of his situation, and receiving his approbation, I was resolved to carry the opening into the substance of the lungs to the full depth of my finger, rather than to leave him to his fate. In both instances I found it necessary to go to nearly the length of my finger ; and at this depth I was so fortunate as to reach an abscess containing at least half an English pint of matter. The patients in both cases were instantly relieved ; and altho they were previously supposed to be in the utmost danger, with scarcely a possibility of recovering, they are now, after several years have elapsed, in perfect health.

In making an opening into such a deep seated abscess, the incision should be carried forward in the most gradual manner, so that no more of the lungs  
may

may be injured than is altogether necessary : But when once the matter appears, the abscess should be laid as freely open as may be proper for an entire discharge of it.

In the subsequent treatment of an abscess of this kind, much attention is required in preserving a proper aperture for the discharge of any matter that may afterwards form in it : for if this be neglected before the abscess is filled up from the bottom, a new collection will soon take place, and the patient will be reduced to the same state of uncertainty and danger he was in before. In wounds which do not penetrate deeper than the teguments or muscles of the thorax, we have observed above, that no kind of tents should be employed ; and have rather advised them to be laid open through their whole length, or to be treated by means of a seton, as we do sores of a similar nature in other parts of the body. But as this is impracticable in penetrating wounds, we are in these under the necessity of inserting a tube into the opening, and of continuing it of a sufficient size and length during the whole course of the cure : it ought indeed to be continued as long as any matter is discharged. Tubes of lead being more soft and pliable than those of any other metal, are therefore to be preferred : They should be broad, and of a round oval form rather than altogether round ; and they should always be furnished with a brim considerably broader than the opening of the sore, to obviate every possibility of their falling into the chest. By inattention to this point, a tube of four inches in length, and of a corresponding thickness, passed altogether into the cavity of the breast of a gentleman who had used it for some time ; and notwithstanding various attempts to extract it, it still remains lodged. It was fixed in the usual way, by a thread, to a bandage going round the body ; but the thread breaking, it immediately slipped in. This happened upwards of a year ago. The patient does not indeed experience much uneasiness from it ; but it

had an evident effect in increasing the quantity of matter discharged from the wound.

I have met with some cases of wounds in the chest, where solid tents have answered the purpose equally well with tubes ; and they may always be used when the parts do not contract so closely round them as to prevent the matter from being freely discharged : But whenever they stop up the passage so much as to produce any collection of matter from one dressing to another, they should undoubtedly be laid aside, and tubes used instead of them.

As tents had been used for a great length of time in almost every wound which penetrated beyond the common teguments, Belloste, and some other surgeons of observation, ventured at last to lay them in a great measure aside. We have already had occasion to observe, that this, to a certain length, was highly proper ; but I cannot agree with some modern practitioners, who assert, that tents and tubes do mischief in every case, and that they should never be employed. Where the discharge from a wound or abscess will continue free and uninterrupted, till a cure is effected by the parts filling up from the bottom, I would never advise either a tent or a tube to be used. But when we find that the external opening of a wound heals up long before the parts beneath are united ; and that matter collects and bursts out again, as in different instances has happened in the course of my experience in penetrating wounds of the chest, it must be from want of experience only, or from a desire of appearing singular, that we refuse to employ the only certain method with which we are acquainted of obviating this inconvenience, and of saving the patient a great deal of pain, trouble, and danger.

In extensive wounds of the thorax, where any portion of the sternum or of the ribs have been removed, a portion of the lungs sometimes protrudes, and does not readily recede. When a practitioner is called soon after the accident, the protruded part should be replac-

ed as quickly as possible : but when a portion of the lungs has been long exposed to the air, and especially if it has been much lacerated by the accident, we should, in the first place, see whether or not it be in a state of mortification ; and all that is clearly and completely mortified should certainly be cut off before the remaining sound parts are replaced. If the incision be confined to a part that is entirely gangrenous, there will be no risk of inducing either hemorrhagies or any other symptom ; and by removing parts which are in this state of disease, we will prevent all the bad consequences which might ensue from their being returned into the thorax.

§ 5. *Of Wounds of the Heart and large Vessels connected with it, and of Wounds of the Thoracic Du&t.*

In wounds of the heart and large blood vessels connected with it, as these parts lie very deep, and as a sound state of them is so immediately necessary for life, the utmost danger is always to be dreaded, nor is the greatest exertion of practitioners able to lessen it. Of such a hazardous nature indeed is every injury of this kind, that we may with propriety consider every wound of these parts as mortal : For although we are told in books, of the heart itself having been wounded without any fatal consequences ensuing, there is much cause to suspect that these accounts are founded on fallacy or error. We can, however, conceive that the heart may be slightly injured without proving instantly fatal ; but even the slightest wound in it must probably at last end in death : For the weakness induced in this manner upon a particular part, will render it very liable to yield to the strong and constant action of this organ. And when once an aneurism is formed in it, it will be apt to proceed with rapidity to a fatal termination.

The most probable method of preventing this, or at least of delaying it, is to lessen the action of the heart by copious blood letting, by low diet, keeping the  
bowels

bowels moderately open, and avoiding every kind of fatigue : If in such circumstances it is possible to save a patient, these will be the most certain means of doing it ; at any rate they will tend to prolong life, which in some cases is of so much moment, that a few days or even a few hours may be of the utmost importance.

The same observations are applicable to wounds in the large blood vessels about the heart. They are to be considered as of equal importance and danger, and to be treated by the same means with wounds of the heart itself.

There is still another organ of importance seated in the chest, which it is proper to mention here, viz. the thoracic duct ; for although wounds in this canal will in most instances terminate in death, yet some advantage may, in particular circumstances, be derived from an attentive treatment of them. The thoracic duct, after leaving the receptaculum chyli, runs along the spine near to the aorta ; and at the fifth or sixth vertebra of the back, it passes behind the aorta ; and ascending to the left subclavian vein, it there empties the chyle.

We judge of the thoracic duct being wounded, from the part at which the wounding instrument entered ; from the discharge being either altogether white like chyle, or mixed with a considerable proportion of it ; and from the patient becoming daily weaker than he ought to do from a wound of the same size in any other part, owing to the nutritive part of his food being carried off before any advantage is derived from it.

With a view to prevent the diameter of this canal from being distended, which at the same time will tend to lessen the extent of the wound, the patient should be kept upon a cooling and very spare diet : any food which he takes should not be at regular meals, but in small quantities frequently repeated ; nor should he be permitted to take a large draught even of the weakest liquor. The bowels should be kept lax ; bodily exertion

exertion of every kind, and much speaking, or whatever tends to quicken respiration, should be avoided.

§ 6. *Of Wounds of the Diaphragm, Mediastinum, and Pericardium.*

We judge of the Diaphragm being injured, from the situation of the wound, and from the nature of the attending symptoms. As this muscle is in constant action during respiration, any injury done to it is necessarily attended with difficulty in breathing ; with much pain during inspiration, not merely in the wound itself, but over all those parts of the chest to which the diaphragm is attached : The patient complains of pain over all the region of the stomach ; sickness, vomiting, and a troublesome degree of hickup take place ; pains in the shoulders sometimes occur, together with cough, delirium, a quick hard pulse, and other symptoms indicating inflammation and fever. Involuntary laughter is mentioned too as a symptom which injuries done to the diaphragm sometimes produce.

It is a common idea among practitioners, that wounds in the tendinous part of the diaphragm will in every case prove mortal, but that injuries done to the muscular parts of it do not so readily prove dangerous. There is much reason, however, to believe, that few wounds in the diaphragm are ever cured, whether they be situated in the tendinous or muscular parts of it ; nor is it evident from observation, that there is more danger to be dreaded in the one case than in the other.

The symptoms of which we have most reason to be afraid, are those which proceed either from inflammation or irritation. With a view to prevent their accession, or to moderate them when they have already appeared, blood letting is to be chiefly depended on ; together with gentle laxatives ; large doses of opiates conjoined with musk ; warm fomentations over the abdomen and thorax ; quietness, and low diet.

By these means strictly pursued, a patient, in such circumstances, will have perhaps a better chance of doing

ing well than by any other mode of treatment ; but his recovery will by no means be certain. A strict antiphlogistic course, and large doses of opium, may probably obviate all the primary symptoms. But however small a wound may at first be in the diaphragm, the constant action and tension of this muscle will be apt to render it daily wider ; and we know from various histories of wounds in this part, that they seldom arrive at any magnitude, without admitting a portion of the stomach, of the colon, or some other part of the bowels, to pass from the abdomen into the thorax ; by which the most violent pain is produced, together with some of the other symptoms which usually accompany a strangulated gut in cases of hernia : In such circumstances, a strangulated gut is much more dangerous than a hernia in its more ordinary form ; for even although we should be able to remove the stricture, by making an incision into the cavity of the abdomen, as the passage into the thorax would still remain pervious, a return of the strangulation might very soon be expected.

Wounds in the mediastinum require no peculiarity of treatment. The circumstances which we have most cause to dread are, a lodgement of blood in one or both cavities of the chest, inflammation and suppuration, with its usual consequences. But the observations we have already made, respecting the management of penetrating wounds in other parts of the chest, apply with equal propriety to these ; so that we need not at present enlarge upon them.

Nor is it necessary to enter minutely on the consideration of wounds in the pericardium. As this bag contains a fluid which we suppose to be necessary for the easy motion of the heart, wounds in it may prove dangerous, from their tendency to prevent this fluid from being collected, as well as from their allowing it to spread through the cavity of the chest. It appears, however, from various observations, that wounds in it do not prove so hazardous as might at first be expected.

ed. They require the same general method of treatment with penetrating wounds of the thorax, which we have already considered.

In every variety of penetrating wounds of the thorax, where the cure is not accomplished without the formation of matter, they are apt to heal slowly; and in some cases, especially where abscesses have formed, a stillicidium of matter will continue for many years; nay, in some cases, for life, notwithstanding all our endeavours to prevent it. As this is an inconveniency which patients are at all times anxious to be free from, practitioners become necessarily much interested in the method of treating it: and, with a view to lessen the discharge, and even to heal the sore through its whole extent, astringent, and what are usually termed Vulnerary Injections, have been advised. But although I have known them frequently employed even by surgeons of reputation, and under the best and most cautious management, I have seldom seen them used without some mischief accruing from them; and I do not recollect a single instance of their being productive of any advantage. They are apt to irritate and inflame the lungs and contiguous parts; and, instead of healing the sore or abscess, they are apt to extend it, by tearing open the surrounding cellular substance.

For this reason, in wounds penetrating the thorax, I do not hesitate to say, that injections should be laid entirely aside: and, however disagreeable a tedious discharge in this situation may prove, that we should trust entirely to the means we have already advised for preventing the matter from lodging, by preserving as free and depending an opening as the nature of the case will admit.

## SECTION

## SECTION XII.

*Of Wounds of the Abdomen.*§ 1. *Anatomical Description of the Abdomen and Parts contained in it.*

THE Abdomen, or lower belly, is the largest cavity in the body ; above, it is bounded by the diaphragm, which divides it from the thorax ; behind, it is supported by the vertebræ ; the upper part of both sides is covered by the inferior ribs ; the rest of it is all bounded by the abdominal muscles, excepting the most depending part of it, which terminates in the pelvis ; from the contents of which it is only separated by the peritoneum ; a firm extensive membrane, which not only lines all the cavity, but affords a coat to all the viscera contained within it, being reflected in a very singular manner over them.

Anatomists divide this cavity into different regions. The middle and upper part of it, reaching from the xiphoid cartilage to within a small space of the umbilicus, is termed the Epigastrium ; the hypochondria are the spaces on each side of this ; the umbilical region extends from three inches or so above the navel, to the same distance beneath it ; and all the parts between this and the pubes are termed the Hypogastric region.

In the treatment of wounds in the abdomen, a minute acquaintance with the parts contained in it, and of their relative situations with respect to each other, and to the divisions or regions which we have just described, is a point of the utmost importance. We shall here give a general description of the different viscera : a more particular knowledge of them is best acquired from dissection.

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The parts contained in the abdomen are, the stomach and intestines; the mesentary, omentum, liver, gall bladder, and ducts: pancreas, receptaculum chyli, spleen, kidneys, ureters, and upper part of the urinary bladder; the aorta, venacava, and other large blood vessels and nerves.

The stomach is a large membranous bag, placed in the upper part of the abdomen immediately below the diaphragm: It stretches from the left hypochondrium, where the most capacious end of it is seated, obliquely across the epigastrium, and terminates before it reaches the right hypochondrium. The stomach has two openings; one termed the Superior Orifice or Cardia, where the oesophagus terminates; and the other the Pylorus, or Inferior Orifice, where the duodenum, the first of the small intestines, begins. The cardia lies nearly opposite to the eleventh vertebra of the back, the large extremity of the stomach stretching considerably to the left; and the pylorus lies somewhat lower, and nearly two inches to the right of the vertebrae. It is proper, however, to observe, that the situation of the stomach and of these two openings is considerably affected by the quantity of food contained in it: So that a wound of the stomach, when it is full, may be directly opposite to an external wound in the teguments, and yet be several inches lower when it is empty.

The intestines commence, as we have just observed, at the pylorus, and are continued by many turnings or convolutions to the anus. This canal is in different parts of it distinguished by different names: The upper part of the canal is termed the Small Intestines; and the under part of it the Larger, from the diameter of the tube being larger in the one than in the other.

Even different parts of these great divisions of the intestines have received different names: The upper part of the small guts, extending about a foot in length from the pylorus, is termed the Duodenum: the next  
portion

portion of the canal, from being commonly found empty, is termed the Jejunum. This in an adult of full growth, is supposed in general to be about four feet and a half in length : it is chiefly situated in the umbilical region. All the under part of the smaller intestines is distinguished by the name of Ileum, from its lying almost entirely within the cavity formed by the ossa ilea on opposite sides of the abdomen. After making several convolutions from one side to another, it at last terminates in the cæcum, the first of the great intestines situated under the right kidney. From the cæcum, which is a round short sac with a small vermiform process, the colon originates : This is the largest of all the intestines ; and as it occupies a considerable part of the abdominal cavity, the course of it merits particular attention. After leaving the right kidney, to which it is attached, it rises and passes under the liver so as to be in contact with the gall bladder, by which it is tinged of a deep yellow : From this it is continued in the form of an arch over the duodenum to the under part of the stomach ; and passing into the left hypocondrium, it is there attached to the spleen and to the left kidney. This curvature is termed the Great Arch of the Colon. It now runs downward and backward : and again turning up, so as to form the figure of S, it terminates at the top of the os sacrum in the last of the great guts, termed the Rectum, from its running nearly in a straight line till it terminates in the anus.

The intestines being very pliable, and of a great length, they have necessarily much freedom of motion ; but as they would be apt to be entangled in each other, Nature has provided a thin membranous web, termed the Mesentery, which running along the course of the intestinal tube, serves to connect it with sufficient firmness to the vertebræ. The mesentery is evidently a production of the peritonæum : In its duplicature there are a number of small glands, which often become so enlarged by disease as to be felt outwardly

wardly through the abdominal muscles; and it serves as a support to the lacteals, blood vessels, and nerves of the intestines. The omentum is a fine thin membrane, which comes into view on laying open the muscles of the abdomen and the peritonæum. In general, it does not pass beneath the umbilicus: but in corpulent people, when it is much filled with fat, it sometimes descends to the very bottom of the belly; and in cases of hernia, it is frequently met with in the scrotum.

This membrane is evidently intended as a protection to the bowels; to afford them an additional warmth; and probably by the fat which it contains to lubricate their external surfaces, so as to admit of their playing with more freedom on each other.

The liver is a large glandular body, situated on the right side immediately under the diaphragm: It is divided into two lobes; one termed the Great and the other the Small Lobe. The great Lobe lies in the right hypochondrium, which it fills almost entirely: it rests on the right kidney, and covers a portion of the great arch of the colon: a considerable part of the small lobe lies in the epigastrium; the rest of it passes over the stomach towards the left hypochondrium.

The liver is of a very irregular figure; its outer surface is arched, corresponding to the figure and size of the arch of the diaphragm. On the other side, it is in some parts flat, and in others concave, according to the figure of the parts with which it is in contact. It is of a considerable size and thickness on the right side; but towards the left its thickness decreases so, that at last it terminates in a thin edge.

The liver is kept in its situation by several ligaments attached to the diaphragm and contiguous parts.

The gall bladder is a pyriform bag, seated in the concave side of the liver. The bile, after being secreted by the liver, is lodged in this bag, from whence it is conveyed into the intestines through the ductus choledochus, which enters the duodenum by piercing its

coats in an oblique direction, about five inches below the pylorus.

The pancreas is a conglomerate gland, lying in a transverse direction between the liver and spleen, immediately under the stomach. The liquor secreted by this gland is carried into the duodenum by a small duct, which in some cases terminates in the gut itself, and in others near to the extremity of the ductus choledochus.

The receptaculum chyli is a small membranous bag, through which the chyle passes from the intestines to the left subclavian vein by means of the thoracic duct. This bag, or sac, lies upon the first vertebra of the loins, a little to the right of the aorta.

The spleen is a large spongy body, seated in the left hypochondrium, between the stomach and the false ribs, under the diaphragm, and immediately above and contiguous to the left kidney.

In Chap. XI. Sect. II. we gave a description of the kidneys, ureters, and bladder; so that at present we need not enter upon it. But, besides the several viscera which we have mentioned, the aorta, vena cava, and the large blood vessels and nerves which supply the bowels, lie all within the abdominal cavity.

We may distinguish wounds of the abdomen in the same manner as we have done wounds of the thorax. They may either be confined to the common teguments and muscles, or they may penetrate the cavity; or a penetrating wound may be complicated with wounds of one or more of the viscera.

## § 2. *Of Wounds of the Teguments and Muscles of the Abdomen.*

In one point of view, wounds of the teguments and muscles of the abdomen do not merit more attention than similar injuries in other parts of the body; but they become highly important from the contiguity of the abdominal viscera, and from the danger of these being ultimately

ultimately injured by the neglect or mismanagment of the external wound.

Our first object is to discover, whether a wound has penetrated the abdomen or not; and whether any of the viscera are injured. When the wound is extensive, and any portion of the viscera protrudes, the nature of the injury is evident; but in smaller wounds where no part of the bowels appear, it is often difficult to judge whether they penetrate the abdomen or not. In general, however, this point may be determined by attention to the following circumstances: By a proper examination with the fingers or probe, after putting the patient as nearly as possible into the posture in which he received the wound: by the form and size of the instrument, the depth to which it run, and the direction it appeared to take; by the quantity of blood discharged at the wound being considerable or not; by the state of the pulse and other attending symptoms; and by the discharge of feces, bile, or any other of the abdominal secretions.

When the wound is of such a size as to admit the finger, we may always determine with certainty whether it reaches the cavity of the abdomen or not; as in this case the finger will come into contact with the viscera: but probes should be used with much caution; and unless the instrument passes easily in, without force, in a direct line, and to such a depth as to convince us that it has reached the cavity, little or no dependence should be placed upon it: For the parts here are so soft, and of such a yielding nature, that a probe with very little force will pass among them almost in every direction to a considerable depth. It is scarcely necessary to observe, that it is particularly proper, in every inquiry of this kind, to put the patient as nearly as possible into that posture in which he received the wound. And the loose texture of the parts should prevent us from using injections, as is frequently done with a view to determine this question. In wounds of the thorax, where the parts are firmer

and more intimately connected, injections may be used for this purpose more safely ; but in the abdomen they are apt to spread among the muscles and cellular substance, by which the test is rendered uncertain, at the same time that mischief is apt to ensue from the pain and inflammation which are induced.

The depth to which the instrument has passed, or the direction which it took, cannot be often ascertained ; but when this information can be obtained, it will assist us in judging of the nature of the wound. By comparing the size of the external opening with the size of the instrument, we may be led to determine the depth to which it has passed.

When the quantity of blood discharged from a wound in the abdomen is considerable, we may conclude almost with certainty, that some of the large internal vessels have been injured ; for excepting the epigastric artery, which runs in the anterior part of the abdomen in the course of the rectus muscle, none of the teguments or muscles of these parts have arteries of such a size as to afford much blood. It is proper, however, to observe, that even the largest artery in the abdomen may be wounded without any blood being discharged externally ; for if the outward opening be not considerable, and especially if the wound runs in an oblique direction, the blood, instead of being evacuated at the opening, will be extravasated into the cavity of the belly, where large quantities of it may be collected, even without any remarkable degree of tension taking place.

In such cases, however, we are soon led to suspect what has happened, by the symptoms which ensue. The patient complains of debility and faintness ; his pulse becomes low ; he is seized with cold sweats ; and if the discharge of blood be not stopped, every other symptom of approaching death soon make their appearance.

It sometimes happens again that we are at once rendered certain that a wound has penetrated the cavity of the abdomen, by the discharge of feces ; of bile ; of  
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the pancreatic juice, or even of chyle : and in some cases, the same certainty is obtained by large quantities of blood being thrown up from the stomach or discharged by the rectum. Urine may be discharged by a wound which does not penetrate the belly ; for the kidneys and ureters may with propriety be said to lie behind the peritonæum, as well as a considerable portion of the bladder ; but they are in general to be treated in the same manner with penetrating wounds in the abdomen,

When, again, none of these symptoms take place ; when neither the finger nor probe can be easily introduced ; when there is no discharge from the wound that leads to suspect the viscera to be wounded ; when the pulse remains natural ; and when the pain is moderate ; there will be much cause to hope that it has not passed to a greater depth than the common teguments or muscles.

In the treatment of these wounds, we are to be entirely directed by the depth to which they penetrate, and by the symptoms which take place.

When it is discovered that a wound in the abdomen does not run deeper than the common teguments or muscles, if none of these parts have been removed, we will seldom meet with any symptoms of importance, at least where the habit of body is good, except where they are the consequence of neglect or mismanagement. Our views here should be nearly the same with what we have advised in wounds of the thorax. The principal object is to prevent inflammation and the lodgement of matter : which is done by blood letting ; a low diet ; the use of laxatives ; rest of body ; and proper attention to the wound. But for a more particular detail of the proper treatment of such a wound, we shall refer to the last section.

It is proper, however, to remark, that wounds in the boundaries of the abdomen, in one circumstance, differ materially from similar injuries of the thorax. As the muscles and other soft parts of the chest are ev-

ery where supported by bone, the lungs and other viscera contained in the breast do not readily push out at the wound ; but as the coverings of the abdomen are of a soft yielding nature, having anteriorly no bone to support them, and many of the contained parts having no very close attachments, they are apt to push forward and protrude wherever any unusual degree of weakness occurs. In all wounds therefore, of the abdomen, even where they do not penetrate, some caution is necessary from this consideration alone ; and more especially so when any portion of the teguments or muscles has been removed. The patient should be kept as much as possible in a horizontal posture during the whole cure : and when he attempts to sit or walk, the weakened parts should be supported by a proper compress, and a firm, somewhat elastic, bandage of flannel passed two or three times round the body ; a caution which ought to be persisted in for a considerable time after the cure of the fore is completed. By want of attention to this point, very troublesome cases of herniæ have occurred, which with ease might have been prevented.

§ 3. *Of Wounds which penetrate the cavity of the Abdomen, but which do not injure any of the contained parts.*

Although an instrument may have penetrated to a considerable depth, we have much reason to hope that none of the viscera are wounded, as long as the abdomen remains free from much pain and tension, the pulse soft, and the skin of a natural heat : But even in this state of such a wound, we are not to conclude that there is no hazard ; for it often happens, that wounds in these parts, which at first exhibit no appearance of danger, at last terminate fatally.

It is proper, however, to observe, that this may often be traced as an effect of improper management, and that practitioners have it frequently in their power to prevent it : For although some instances will oc-

cur of wounds of this kind ending fatally, where no symptoms appeared of the viscera being wounded, and where after death no immediate injury was found to be done to them, yet this will not usually happen in such wounds that are properly treated from the first.

The danger which occurs here arises chiefly from two causes : from the access of air to the cavity of the abdomen, by which the different viscera are apt to become inflamed ; and from the subsequent formation of matter, which, not finding an opening, will necessarily collect within the peritoneum.

In every wound therefore, of this kind, after securing any blood vessel of the teguments or muscles that may have been cut, and which we should always do by ligature immediately on its being discovered, our next object should be to prevent, with as much certainty as possible, all manner of access to the air. In small wounds of these parts, this will be done with most ease and certainty merely by the lips of the cut being drawn together, and secured with several plies of adhesive plaster : and as a farther security, a compress and flannel roller, such as we have mentioned above, may be put over the whole : The same precautions with respect to blood letting ; a strict antiplogistic regimen, and rest of body, which we recommended in more superficial wounds of the abdomen, should be here carefully observed where the danger is more considerable.

By this management these wounds, when small, will often heal by the first intention ; but when they continue open for some time, they should be dressed as seldom as possible, and the dressing should be renewed with as much expedition as the nature of the case will admit, so that the unnecessary admission of air may be avoided as much as possible.

It will sometimes happen, however, even that the most exact attention will not prevent the accession of bad symptoms : At first they will most readily be of the inflammatory kind, which will be removed by farther evacuations of blood and attention to the other

circumstances we have enumerated ; or they will prove fatal, by ending in mortification ; or they may terminate, as we have mentioned above, in the formation of matter. It is this last occurrence which we have now to advert to.

In such circumstances, we would advise an opening to be made in any other part of the body immediately for the discharge of the matter : But in these depositions in the abdomen, we can never discover with certainty, whether any collection has taken place or not, till it has continued for a considerable time : for the matter here lies so deep, that a small quantity cannot be distinguished ; nor would it be proper for the discharge of a small quantity of matter to incur that danger which always attends the free admission of air to the abdomen ; and in small collections this could not be avoided, as there would be a necessity of opening them in a slow gradual manner with a scalpel, as in such cases the trocar could not be plunged in without much risk of hurting the viscera. Instead of such an attempt, therefore, we should do nothing as long as the quantity of matter continues moderate, and while no bad symptoms have yet taken place. Indeed this is a good general rule in all wounds of the abdomen, never to inquire with much anxiety either for collections of matter, or for such parts as from the nature of the wound there might be cause to suspect should be injured, till the appearance of symptoms renders it probable that the one or the other has taken place : for by much handling we often do mischief ; while frequently no danger ensues from wounds which at first were attended with very alarming symptoms. Nay we know, that in different instances a person has been run through the body with a small sword without any of the viscera being injured, and the patient has done well without any bad symptom taking place. And we likewise know, that violent inflammation will sometimes terminate favourably without the formation of matter ; and even when matter is formed, that it will  
sometimes

sometimes be carried off by absorption, so as to leave no vestige of its having ever existed. It is the actual presence therefore of bad symptoms produced by such collections of matter, or the quantity of matter becoming so considerable as to prove inconvenient to the patient, that should indicate the propriety of making an opening for discharging it : But as soon as we find this to be the case, we should not hesitate ; and whenever there is such a quantity collected as to admit of the trocar being employed, we may draw it off with ease and safety : For by inserting the instrument in an oblique direction, no air will be admitted ; by which the only risk which attends this operation will be avoided. I have been the more particular upon this subject, from having observed two cases of this kind terminate fatally where there was not previously any appearance of danger. As it was evident in both cases that matter was collected, it was determined to discharge it ; and as it was supposed to be seated either in a particular cyst, or in the substance of the muscles and not in the cavity of the abdomen, it was done by making a small opening into it with a scalpel. But in both, the most violent symptoms of inflammation occurred in the course of the first two days ; and the patients soon died. And I conclude that it was by the free admission of air to the cavity of the abdomen that these symptoms were induced : for after death the matter was found to be lodged in that cavity ; and I have since that time, in two similar cases, drawn large quantities of purulent matter off with a trocar, where it was evidently seated in the abdomen, without any bad consequences ensuing.

In drawing off matter from the abdomen, the same precautions are necessary in doing it that are now so universally admitted in discharging serum by the usual operation of the paracentesis. But as we gave a particular account of this in Chapter XXI. we must now refer to what was then said upon it.

Penetrating

Penetrating wounds of the abdomen may prove dangerous from another cause. Considerable portions of the bowels are sometimes protruded, without any other injury being done to them ; and this may be productive of fatal consequences.

The most certain method of preventing danger in all such cases, is to return the protruded parts as quickly into the belly as can be done with propriety. Almost every writer upon this subject desires us in the first place to foment them with warm emollient decoctions, or to cover them for some time with the web or omentum of some new killed animal : but they do not recollect, that during the time lost in making these preparations, the protruded parts will probably suffer more than can be gained by the application of them ; and that the most natural, as well as the most proper fomentation for them, is the heat and moisture of the patient's belly. In recommending these applications, it is said, that they not only remove the dry parched state of the parts which exposure to the air is apt to induce ; but by means of them we are enabled to judge with more certainty whether or not they are in a state that admits of their being returned with safety : for it is alleged, even by some writers of reputation, that parts which are apparently in a state of incipient gangrene, and which otherwise we might be afraid of pushing into the abdomen, may, by a proper use of these fomentations, be so far recovered as to render it highly proper to return them.

But although this opinion has been very generally received, and the practice followed which it inculcates, it appears to me to be so fraught with impropriety and danger, that I cannot pass it over without mentioning in the strongest manner the idea I entertain of it. Much mischief may be produced by it, and I see no advantage that can accrue from it.

By many it is said, that no part of the intestines should be returned into the abdomen that have once acquired any tendency to gangrene, on account of the  
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risk of the feces bursting into the belly, by which the patient would necessarily die. Wherever there is a certainty of such an occurrence, by the parts being actually in a state of gangrene, to return them to the abdomen would no doubt be highly improper, as it would be depriving the patient of the only chance which he can have of a recovery, that of securing the ends of the sound parts of the gut at the mouth of the wound, by which there may be some possibility of their uniting afterwards, as has happened in different instances ; and by which he will at least be certain of having at all times a free discharge for the feces. But although in this situation the practice we allude to is to be considered as highly proper, yet when gangrene has not actually taken place, as there will still be some cause to hope that the natural heat of the belly may prevent it, the parts should be instantly returned.

When parts protruded from the abdomen are covered with sand, dust, or any other extraneous matter, it will no doubt be proper to clear them of it before they are replaced ; and with this view, bathing them in warm milk, or in milk and water, may answer better than any other method. But this is perhaps the only cause that can render the practice necessary.

Some address is necessary in returning any part of the intestines which have been protruded in the easiest manner. The patient should be put into that posture which will most effectually relax the parts in which the wound is seated, with his head and chest somewhat lower than the abdomen and buttocks, so that the weight of the bowels may have some effect in dragging in the protruded parts. When in this situation, the surgeon having his fingers dipped in warm oil, or covered with soft oiled linen, should endeavour to replace the parts by beginning his pressure at one of the ends of the gut, and continuing it along the doubling or curvature to the other. In this manner any portion of the bowels will be easily replaced without any farther enlargement of the wound, when the opening is  
not

not very small : And when any part of the omentum, or any others of the viscera, are protruded, there will be still less difficulty in returning them. But considerable parts of the intestines are frequently pushed out at such small punctures, that they cannot be returned but with much more pressure than should ever be applied to them. In this case, our object will be more easily accomplished, and with less hazard to the patient, by enlarging the opening, than by the application of so much force as is generally required in pushing any considerable portion of gut through a small aperture. Some dexterity, however, is necessary in enlarging an opening in this situation. When the aperture is of such a size as to admit the finger of the surgeon, it may be done with ease and safety : but in some cases it is so completely filled with the parts which pass through it, that this is impracticable. In this situation, we are advised by authors to insert a director between the bowels and the parts to be divided, and to enlarge the opening by cutting upon it either with a scalpel or bistoury. This, however, must be attended with much hazard ; for we can never distinguish with certainty whether some plies of the bowels be elevated by the director or not, as this will sometimes happen notwithstanding all our care to prevent it. Instead of following this method, I have in different cases enlarged the opening, by making an incision through the integuments and muscles with a scalpel, in the same gradual manner that we operate in cases of hernia ; taking care, as soon as the peritoneum is laid bare, to introduce the end of a probe pointed bistoury between it and the gut, and dividing it as far as may be necessary, which now may be done with entire safety. If in this manner the opening be enlarged so as to receive the point of the finger, it may afterwards be increased at pleasure, by inserting the finger so as to act as a conductor for a bistoury or scalpel : But till it can be done in this way, no cutting instrument should ever be passed into the abdomen ; for although  
much,

much ingenuity has been shown in the invention of instruments with wings to protect the bowels in this part of the operation, yet none of them answer any other purpose than to render the business more complex.

In enlarging a wound in this situation, it should be done as much as possible in the direction of the muscular fibres of the parts ; and, for an obvious reason, the incision should commence at the bottom of the wound, and be carried downwards, and not at the top.

We may thus enlarge the opening to any necessary extent, always taking care not to make it larger than the nature of the case may require. And this being accomplished, the protruded parts should be replaced with as much expedition as possible in the manner we have advised. In returning bowels to the abdomen, it has sometimes happened, through confusion or mistake in the operator, that they have been pushed in between the layers of the abdominal muscles. This should be guarded against with the utmost attention ; for when left in this situation, the patient will be nearly in the same danger as at first. Indeed this will be the case if they be not placed altogether within the peritonæum.

The accident we allude to may happen in any part of the belly, when a surgeon is not sufficiently accurate and attentive : but it is most likely to occur in wounds that pass through either of the recti muscles, owing to the sheaths of these muscles being particularly loose and flaccid ; and it will more readily happen in corpulent people than in others, owing to the great depth of fat and cellular substance which, in subjects of this description, lie above and between the different muscles of the abdomen.

Instead of enlarging the opening in the abdomen, it has been proposed to discharge the air contained in the protruded portion of the bowels by making holes in it with a needle, by which the bulk of it may be so much diminished as to admit of its being easily replaced at  
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the same opening. As this has been mentioned by writers of experience, I think it right to speak of it; but it is chiefly with a view to caution the younger part of the profession against it. It may indeed be done with more ease to the operator; but this appears to be the only argument in its favour: For although some may have recovered on whom it has been practised, yet surely the smallest opening made into the gut must be attended with much more danger than can probably arise from the external opening in the teguments and muscles being somewhat enlarged. And besides, in reducing protruded bowels, however distended they may be with air, we may often render them perfectly flaccid by pressing the air contained in them into that part which remains in the abdomen. And if this be cautiously done, it may at all times be attempted with safety. Indeed no trial should ever be made for the reduction of a portion of intestine that is much inflated, till we have endeavoured in this manner to reduce the size of it.

After the bowels are replaced, our next object is to preserve them in their situation till the wound is so firmly consolidated as to prevent them from falling out. When the opening is small, this may be effectually done by laying the patient in a proper posture, with his head and buttocks elevated; by preventing costiveness; and by a firm roller of flannel passed several times round the body, so as to support the injured parts till they are united. But in extensive wounds of the abdomen, it is found, even when they are treated with every possible attention, that it is difficult, and in some cases impossible, to prevent the bowels from prolapsing by the ordinary dressings and bandages. In such cases, we are under the necessity of drawing the sides of the wound together by sutures; an operation commonly termed *Gastroraphy*.

Various methods have been proposed for making this suture; but the common interrupted suture, or the quilled suture, which is merely a variety of the  
other,

other, answers the purpose better than any of them. Much care and attention, however, is necessary in passing it, particularly in avoiding the bowels, which every where lie contiguous to the parts to be united.

The surgeon being provided with a number of broad flat ligatures, sufficient for the extent of the wound, and of a strength that will retain the parts together, each ligature should be armed with two large curved needles, one towards each end; and the patient being laid in a posture that is most easy for himself, at the same time that it relaxes the injured parts most effectually, the surgeon should now insert the fore finger of his left hand into the wound, and being sure that it is in contact with the peritonæum, without any of the bowels lying between them, he should now pass the point of one of the needles along his finger to the distance of an inch at least from the edge of the wound; and having secured the other end of it with the thumb and palm of his hand, he must now push it outward, so as to make it pierce the skin at a similar distance from the external wound in the teguments. In this he will be much assisted by pressing the muscles and skin down upon the needle with his right hand: and one of the needles being passed, the other must in like manner be pushed through the opposite side of the wound, by carrying it also from within outward. It might indeed be done by entering the needle outwardly, and carrying it in upon the finger: but we could not in this manner avoid the bowels with such certainty; a point of the utmost importance, and requiring the nicest attention.

The first needles should be passed within half an inch of the upper part of the opening; and the others should be continued to within an equal distance of the bottom, at the distance of three quarters of an inch from each other; for as the retraction of parts divided in this manner is more to be dreaded than any other occurrence, it ought in a particular manner to be guarded against. The ligatures being all inserted, the  
parts

parts should now be supported by an assistant ; and a proper knot being tied upon each of them, the whole extent of the wound should be covered with a pledgit of lint spread with any unctuous substance, for preventing access to the air. After this, the parts should be supported with a roller : The patient should now be put to bed, and should be treated in the manner we have directed above, with blood letting, and a low regimen, in proportion to the violence of the symptoms which supervene.

In performing this operation, I have said that the ligatures should be continued to within half an inch of the bottom of the wound ; which is contrary to the usual practice. In general an opening is left beneath, with a view to discharge any matter that may form in the course of the cure ; but there is no sufficient reason for doing so. Instead of proving serviceable, it is probable that it must often do harm, by giving free access to the air, which in every wound of the abdomen should be particularly guarded against. The opening could not be preserved without the assistance of a tent, by which much irritation and pain might be induced : nor would it ever answer the purpose of discharging the matter, excepting it be accidentally situated near to the under part of the abdomen. I am clear, therefore, that the whole extent of the wound should be treated in the same manner ; and if matter should afterwards form, that it will be better to trust to its being absorbed, or even evacuated by the trocar in the manner we have already mentioned, than to trust to this precarious method of treatment.

When any practitioner prefers what is usually termed the Quilled Suture, the one we have described may be easily converted into it, by introducing each of the ligatures double. After all the ligatures are passed, a small roll of plaster, or a piece of a large bougie, should be passed through the different loops, which ought all to be on one side of the wound ; and a similar roll being placed on the opposite side between each of the  
ligatures,

ligatures, they must now be tied upon it with running or bow knots, of such a tightness as may appear to be necessary ; care being taken during this part of the operation to have the sides of the wound properly supported by an assistant.

If the parts are properly and equally drawn together, we will seldom find it necessary to remove the ligatures till the parts are united ; which they will always be in six or seven days, if they have been kept in close contact, and if no unusual cause has occurred to prevent it. But when the ligatures give much pain, and especially when the patient complains of much tension over the abdomen, the knots should always be untied and kept perfectly loose, till by blood letting, fomentations, and gentle laxatives, these symptoms are removed, when the parts may be again drawn together and secured as before.

We have hitherto been supposing that the protruded part consists of a portion of the alimentary canal only, this being the part which in wounds of the abdomen is most frequently pushed out : but it is proper to remark, that the other viscera are also liable to be protruded, particularly the stomach and omentum. This, however, does not vary the method of treatment, which ought to be nearly the same which ever of the viscera be pushed out. The parts should in every instance be replaced as quickly as possible, and retained in the manner we have already pointed out.

We are now to consider the treatment of those wounds in the abdomen which are attended with injuries done to one or other of the viscera. And in the first place, wounds of the alimentary canal require our attention, as being most frequent.

#### § 4. *Of Wounds of the Alimentary Canal.*

In a former part of this section we have observed, that wounds of the intestines may be discovered by the discharge of blood from the mouth and by the anus, as well as by the discharge of feces from the wound in

the teguments : We likewise judge of this point by the discharge of fetid air from the wound, and from the depth and direction in which the instrument appeared to run.

By attending to these circumstances, and to the symptoms with which wounds in the intestines are commonly attended, such as nausea, sickness, violent gripes, or pains through the abdomen, cold sweats, and faintings, we may in general determine with much certainty whether they are injured or not. But unless the wounded part be brought into view, little or no advantage is gained by the discovery : for while it remains undiscovered, our method of treatment must be nearly what we have recommended for wounds which merely penetrate the cavity. Authors indeed direct us to search for the wounded part of the gut : But as the danger from the extent of the wound, which in this case would be requisite, as well as from the exposure of the contents of the abdomen, would probably be greater than from allowing the wounded part to remain, this attempt ought never to be made ; the more especially as we know that wounds in the intestines have been healed, although the injured part has not been discovered.

When we find, however, that a wound is inflicted on a portion of protruded gut, we ought by no means to replace it till we endeavour to prevent its contents from being effused into the cavity of the abdomen ; which can only be done by sewing up the opening.

There are different methods proposed for securing openings of this kind. Le Dran thinks that it may be done with most safety by what he terms the Looped Suture ; while the generality of practitioners effect it by the Glover's Suture. The looped future is performed in the following manner : One end of the wound is to be held by an assistant, while the surgeon does the same with the other ; and the needles, which should be round, straight, and small, carrying each of them a thread a foot long, must be equal to the number

ber of stitches intended to be made. As many of the ligatures are now to be passed through both lips of the wound as appear to be necessary, taking care that they are nearly a quarter of an inch distant from each other. The threads being all passed, and the needles removed, all those on one side of the cut must be tied together with a knot at their ends, and those on the opposite side must afterwards be secured in the same manner. They are now to be joined together, and to be twisted two or three times round, so as to form a kind of a cord : By this means the divided parts of the intestine are puckered together, so that the stitches, which before were distant about a quarter of an inch, are now brought close to each other. The future being thus finished, an assistant must hold the two ends of the twisted threads, whilst the surgeon replaces the intestine in the manner we have already directed. The threads are to be secured to the bandage, which is put over the dressings ; and after remaining till the wound in the gut may be supposed to be healed, they are to be untwisted ; and one side of each of them being cut off close to the external wound, they must now be drawn cautiously and separately away.

The principal objection to this method of stitching these wounds is, that in some degree it must contract the diameter of the gut, by which dangerous obstructions might afterwards be produced. Instead of it the Glover's Suture, as it is termed, is commonly practised. In making this future, a small, fine, round needle should be used, armed with a thread of silk. The surgeon laying the lips of the wound exactly together, must perforate both at the same time ; and carrying the needle to the same side at which it entered, he must now make a second stitch at a small distance, perhaps at the eighth part of an inch from the first ; and in the same manner must continue, by a proper number of stitches, to draw the whole extent of the wound together. This being done, a sufficient length of the thread is to be left out at the external wound, for the purpose of

drawing it away when we suppose the wound in the gut may be united.

Even this method of treatment, however, must evidently tend to lessen the diameter of the gut ; and I think the operation may be performed with the same degree of security, and in a manner that will obviate this difficulty, by entering the needle always from the inside of the gut, and pushing it outward. The operation should commence near to one end of the wound : the needle being pushed through one side of the gut, the ligature should be drawn forward and retained by a knot formed on the end remaining in the inside. The needle must now be carried straight across and entered in a similar manner, so as to pierce the opposite side of the wound also from within ; but the following and every succeeding stitch will not be opposite to each other. When the operation is rightly performed, the needle will be carried from one side of the wound in a diagonal line to the other, and will enter the gut at the distance of two tenths of an inch from the point which it came from on the opposite side. In this manner the sides of the wound may be drawn closely and exactly together, without lessening the diameter of the gut in any degree ; and the end of the ligature may at last be secured and cut off close to the other extremity of the wound, if the gut is to be put freely into the abdomen ; or it may be left of a sufficient length to hang out at the wound in the teguments, if it is the meaning of the operator to retain the wounded part of the intestine in contact with the external opening. This indeed is usually done, that we may have it in our power, as it is said, to draw away the ligature on the wound of the gut being cured. It is probable, however, whatever future may be employed, if more than one or two stitches have been passed, that it will be very difficult, and even uncertain, our getting the ligature away, without hurting the intestines more than we ought to do. I would never advise, therefore, with any view of this kind, that the ligature

ature should be left out at the wound ; less danger will arise from cutting it entirely away, and allowing the stitches to remain : a considerable part of it will fall into the cavity of the gut ; and in such circumstances the danger of the patient from other causes is so great, that any additional risk that can occur from the remaining part of it, must be so trifling as not to deserve notice. But in extensive wounds of the intestines, where there may be much cause to fear that the operation will not prove successful, with a view to prevent the feces from being emptied into the abdomen, it may be proper, by means of the thread used for the ligature, to retain the injured part in contact with the wound in the peritonæum. But of this we shall presently speak more particularly.

This is the method of treatment which we would advise when the gut is not cut entirely across ; and, however small a wound of the intestines may be, it ought always to be secured with a ligature : for although it is alleged by some authors, that we should rather trust to nature for the cure of a small opening here than to insert a ligature ; to me it appears that their opinion is by no means well founded ; inasmuch that I would not leave even the smallest opening that could admit either feces or chyle to pass without stitching it up. But where any part of the alimentary tube is cut completely through, some difference will be necessary in the method of management.

When both ends of the divided gut protrude at the wound, it ought to be our object to bring them into contact in such a manner as to admit of their uniting. There are different modes of effecting this. It has been done by stitching the two ends of the gut to the peritonæum and abdominal muscles, exactly opposite and contiguous to each other ; and although the feces must in this manner be evacuated for some time by the wound, yet different instances have occurred of the two ends of the gut adhering firmly together, and being completely united in the course of a very short

time : Of this two cases have fallen within my own observation.

In such circumstances we are commonly advised to plug up the opening in the end of the upper extremity of the gut, not only with a view to keep the patient clean and comfortable, by preventing the feces from being at all times pushed out, but to prevent, as we are told, the gut from contracting and from being diminished in its diameter. I am convinced from experience, however, that this precaution is very unnecessary ; and I know that it proves hurtful. Instead of introducing tents or doffils of any kind, the outward sore should be dressed as lightly as possible ; and if care be taken to keep the patient clean, the rest should be trusted entirely to nature.

This is, perhaps, the best method of managing this variety of wound ; but the same inattention may be answered by inserting the upper extremity of the divided gut into the end of the other, and stitching them together. In this situation it would be difficult to draw the divided parts together with a needle and ligature, without hurting the opposite sides of the gut, in any other way than by keeping it extended by means of some round body inserted into it. For this purpose it has been proposed to make use of a tube of thin pasteboard or paper ; but as this might be laid hold of and kept firm by the ligature, a small roll of tallow is preferable, as it will afterwards melt and pass easily off with the feces. A piece of it, nearly equal to the diameter of the intestine, should be inserted into the end of the upper portion of the gut ; and being afterwards passed into the other, so as to carry the one, to the extent of an inch or thereby, fairly into the other, the two portions should now be stitched together with a small needle armed with a fine thread. The stitches should be carried completely round the gut ; and in order to give them as great a chance as possible of succeeding, they might even go twice round ; first at the edge of the under portion of gut, and afterwards about  
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an inch beneath, near to where the upper part of it terminates.

In the insertion of one extremity of the gut within the other, we have desired, for an obvious reason, that the end of the upper portion should be put into the other ; but it requires some attention to make the distinction. The peristaltic motion will be observed to be more remarkable in the upper division than in the under : But the most certain method of judging, is to observe at which of the ends the feces or chyle are evacuated. An inversion of the usual motion of the bowels might indeed produce a deception ; but as this is not a common occurrence, we are not to suppose that at this particular time it is likely to happen.

In wounds of these parts, a portion of divided gut sometimes hangs out at the wound, while the other end of it has slipped into the abdomen. In such circumstances, authors in general advise the end of the gut to be stitched to the peritonæum, and other parts contiguous to the wound. If it proves to be the upper part of the gut, the patient, it is said, may live under the inconvenience of an artificial anus ; and if it be not near to the upper part of the smaller intestines, that a sufficient quantity of chyle may be carried into the blood for his support and nourishment. But in the event of this proving to be the under part of the gut, although death would certainly ensue were we to rest satisfied with this, it has scarcely been supposed that we ought to proceed farther.

I am clear, however, that this will not prove satisfactory to the feelings of any practitioner possessed of that degree of fortitude which our art requires, and who has that regard for the safety of his patient which every surgeon ought to possess. And although I have advised, in wounds of the intestines, when no part of them protrude, where we cannot therefore know whether the wound be large or only a small puncture, and where the injured part may be so situated that it

could not be reached without opening the greatest part of the abdomen, and turning out perhaps the whole alimentary canal, that we had better allow the patient to have the chance of recovering without any attempt to make a discovery, and which he may do if the wound is small, than to propose a measure, which of itself might be attended with more hazard than the injury for which it was meant to be a remedy. Yet, when we are rendered certain of the gut being completely divided by one end of it hanging out of the wound, as this will give much cause to imagine that the other is at no great distance, I think it ought by all means to be searched for, by enlarging the external wound so as to admit of the fingers of the operator being freely inserted. Even where the upper part of the gut is protruded, it is worth while to submit to this inquiry, merely in order to have at least some chance of avoiding the loathsome inconvenience of an artificial opening for the feces : And where the upper part of the gut has slipped in, the patient can have no chance for farther existence if it be not discovered. In such a situation, therefore, we should not hesitate as to the measures.

In wounds of the abdomen, the intestines, besides being protruded and wounded, are sometimes mortified ; and they are sometimes mortified without being wounded. But whether mortification be combined with a wound or not, the method of treatment should be nearly the same.

Where there is only a tendency to gangrene from the parts being much inflamed, they should be returned immediately into the abdomen, for the reasons we have given in a preceding part of this section. But whenever they are entirely mortified, the black dead spot will soon fall out ; and the remainder being thus reduced nearly to the state of a sore from any other cause, the same method of cure will become applicable.

Authors in general, have treated of wounds of the small and great intestines separately : but no necessity appears

appears for this; they are nearly of the same nature, and require the same method of treatment. The smallest injury done to the bowels is always hazardous, and in every instance of it our prognosis should be doubtful. But it is said, that wounds in the smaller intestines are more particularly dangerous than in the others; from their being more apt to induce violent degrees of inflammation: I have not observed, however, that this is confirmed by experience.

§ 5. *Of Wounds of the Stomach.*

In wounds of the abdomen, we conclude that the stomach is injured, from the part at which the instrument entered, and from the depth and direction in which it appeared to run; from the patient being seized with a vomiting of blood; from his complaining of a great and unusual degree of sickness; of languor and singultus; and from the food and drink being evacuated at the wound soon after they are swallowed.

All wounds in the upper part of the left hypochondrium which pass to any considerable depth, as likewise those of the epigastrium, will necessarily enter the stomach; but wounds of any part of the abdomen may reach it when they run in an oblique direction: And it ought to be noticed, as we have elsewhere observed, that wounds may penetrate this viscus when it is full, which would not touch it when empty.

Wounds of the stomach must always be considered as dangerous, and a doubtful prognosis only should be given; for although there are many instances on record of their being cured, yet this is by no means so common as to warrant our expecting it.

The same plan of treatment which we have advised in wounds of the intestines applies with equal propriety to wounds of the stomach. When the wounded portion protrudes, it should be stitched up and replaced as quickly as possible. But even where it does not protrude, it ought to be searched for; and when the  
anterior

anterior part of the stomach only has suffered, it will not be difficult to discover it. We should not, however, be deterred from the inquiry by the seat of the wound: for we may be able to reach it wherever it may be, excepting in the posterior part of the stomach.

It is to be observed, that wounds of the stomach are more readily discovered than wounds of the intestines; for these last are more concealed by convolutions of themselves, as well as by other viscera.

In all wounds of the stomach and bowels, the patient should be put upon as strict a regimen as his strength will bear; not only with a view to prevent the accession of inflammation, which, as we have formerly observed, is the most dangerous symptom that can occur, but to prevent the injured parts from being distended, by which they might be very materially hurt. Instead of regular meals, a spoonful or two only should be allowed at once; and no more given even in this way than is merely necessary to support life. In wounds of the stomach and upper part of the smaller intestines, we might venture in a great measure, and at least for several days together, to trust to nourishing glysters: but this should be carefully avoided in wounds of the great guts; as the injected liquor might more readily be forced in this way into the cavity of the abdomen than if it had been taken by the mouth.

#### § 6. *Of Wounds of the Omentum and Mesentery.*

We have already mentioned the situation of these parts. But we have no means of judging whether they have suffered by wounds of the abdomen or not, if they be not protruded.

When it is found that a protruded portion of omentum is injured, we ought to see whether any part of it be nearly separated from the rest or not: for whatever part of it is in this state, should be immediately removed; or when it has become cold, with much reason to dread that it will mortify, it will likewise be  
proper

proper to remove it. But when no appearance of this kind takes place, we should advise it to be immediately returned into the abdomen.

In the first Volume of this Work, we found it necessary to enter upon the consideration of this subject when treating of *Herniæ*: It will therefore be proper to refer to what we had then occasion to say upon it.

In wounds of the mesentery, what we have most to dread is the discharge of blood or chyle into the cavity of the abdomen; for as the lacteals, together with a great number of arteries and veins, run in the duplicature of this membrane, it can scarcely be injured without some of them suffering. Whenever any portion of it, therefore, is protruded, it ought to be examined with accuracy: and when any of its vessels are found to be divided, they should be immediately tied with ligatures; the ends of which being left out at the wound, will admit of their being taken away as soon as they are thoroughly separated.

### § 7. *Of Wounds of the Liver and Gall-bladder.*

From the anatomical description we have given of the contents of the abdomen, it appears that the liver will be very apt to be hurt by all wounds that penetrate either the right hypochondrium or epigastrium.

The liver does not appear to be possessed of much sensibility; for many instances have occurred where superficial wounds in it have healed with the same ease, and have not induced any more alarming symptoms than what usually occur from wounds of the same extent in any other part of the body. But wounds of this viscus, which pass to any considerable depth, are always to be considered as dangerous, from the great quantity of blood which is sent to it, as well as from the interruption which they may give to the formation of bile, one of the most important secretions in the body: And they are apt to prove particularly hazardous, from their allowing the bile, which is very soon rendered

rendered putrid, to be poured into the cavity of the abdomen.

We judge of the liver being injured, from the situation and depth of a wound ; from the quantity of blood that is discharged being more considerable than could probably be afforded by any blood vessels of the integuments or muscles ; from bile being discharged along with the blood : from bile tinged with blood being carried into the bowels, and discharged both by the stomach and anus ; from the abdomen being apt to swell and become tense ; and from pain being felt on the top of the shoulder, an usual symptom in different affections of the liver.

All that we can do in wounds of this viscus, is to guard as much as possible against excessive hemorrhagies, and to discharge any collections of blood or of bile that may form in the abdomen, when they become so considerable as to render it necessary. We endeavour to prevent or put a stop to the hemorrhagy by blood letting, gentle laxatives, keeping the patient cool, and at perfect rest both in body and mind. And we discharge collections of this kind, by making an opening in the most depending part of the abdomen, or wherever they may happen to form.

Wounds of the gall bladder are by experience found to prove more dangerous than wounds of the liver ; for they are still more difficult to heal, at the same time that they are more certainly productive of extravasation of bile into the abdomen. Instances indeed have happened of the bile being so completely obstructed in its passage from the gall bladder to the duodenum, that the bladder has swelled so as to produce much external tumefaction : And, in some cases, these swellings, after bursting or being opened, have continued to discharge bile for a considerable time ; and at last have been known to heal without producing any extravasation into the abdomen, or any other alarming symptom. This, however, proceeds from the previous distention of the bladder having produced.

ed an adhesion between it and the neighbouring parts ; by which, when an opening is made into it, the bile is prevented from spreading. But few instances have occurred of wounds in this viscus having a favourable termination. To procure as free a vent for the bile as possible, and to discharge it by an opening such as we have mentioned, when it collects in the abdomen, is perhaps all that we ought to attempt.

§ 8. *Of Wounds of the Spleen, Pancreas, and Receptaculum Chyli.*

When the spleen is laid bare, we easily discover whether it be injured or not : but as it does not afford any particular secretions by the appearance of which we might be determined, and as wounds of it do not excite any remarkable set of symptoms, it is difficult to judge merely from the depth or direction of a wound whether it be hurt or not. It is observed indeed, that the blood discharged immediately from the spleen is of a peculiar deep red colour ; but this test is not to be depended on : Nor are we to conclude from the quantity of blood being considerable which a wound in the region of the spleen may discharge, that this viscus is certainly injured ; for it lies so near to large blood vessels belonging to other viscera, particularly to the emulgent arteries and veins, that no certain judgment can be formed from this circumstance.

The same observations which we have made upon wounds of the liver will apply with propriety to wounds of the spleen ; only we may suppose, that the danger attending the latter will not be so considerable, as no material secretion will be interrupted by them.

As the pancreas lies deeply covered with the other viscera, wounds of it can seldom be discovered : But as a division of the duct of this gland will prevent the secretion which it affords from being carried to the bowels, this may, by interrupting or impeding digestion, do much injury to the constitution ; and as the  
liquor

liquor will be effused into the cavity of the abdomen, it may thus be productive of collections, the removal of which may ultimately require the assistance of surgery.

Wounds of the receptaculum chyli will be distinguished from their situation, and from the discharge being a thin milky kind of liquor. They must necessarily be attended with much danger, as they will deprive the patient of the greatest part, or even of all the nourishment which he ought to derive from his food. They can never in any way become the object of surgery, but by producing collections in the abdomen which may require to be discharged.

### § 9. *Of Wounds of the Kidneys and Ureters.*

In a preceding part of this Work,\* we have mentioned the situation of the kidneys ; an accurate knowledge of which is an object of much importance in judging whether penetrating wounds in these parts may have injured them or not. But in general we may be determined by the symptoms which take place.

The external coverings of the kidney may be hurt without any symptom of importance being induced ; but neither the pelvis of the kidney, nor the ureters, can be penetrated without some or perhaps all of the following symptoms taking place : The patient complains of violent pain, not merely in the part itself, but over the whole loins, in the groin, yard, and even in the testicles ; he is liable to much sickness and vomiting ; the urine is passed with pain and difficulty, and along with it more or less blood is usually discharged ; and although the greatest part of the wound may heal, it commonly happens that a fistulous opening remains during life.

When the kidney is pierced by a wound entering from the belly, the urine is apt to be extravasated into the cavity of the abdomen : But when it is wounded  
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\* Vide Chap. XI. Sect. II.

from the back, or even from the side, the urine will either pass directly out at the opening, or it will spread through the contiguous cellular substance; for as it is situated behind the peritonæum, it will not in this case find access to the belly. The risk, therefore, with which wounds of this organ are attended, will depend in a great measure on this circumstance. When the urine passes into the abdomen, the danger will be very great; but when this does not happen, if the patient survives the hemorrhagy with which the wound is at first attended, he may have a tolerable chance to escape, with the inconvenience of a fistulous opening at which the urine will continue to be discharged. Instances indeed have occurred even of this being at last cured; but they are so rare, that they are scarcely to be looked for. All that art can with propriety attempt, is to prevent the urine from lodging; and, if the sides of the opening become callous, to render them raw from time to time, either with the scalpel or lunar caustic, by which they may at last be made to unite.

### § 10. *Of Wounds of the Bladder.*

The bladder when empty, lies altogether within the bones of the pelvis; but when filled with urine, it rises considerably higher, insomuch that, when the urine is long obstructed, there are instances of its reaching to the umbilicus. In judging, therefore, whether injuries done to these parts have penetrated the bladder or not, we must know whether it was empty or full. But for the most part this point is easily determined; as in general the urine comes away by the wound, and even that which passes by the urethra is at first always tinged with blood.

The danger from wounds of the bladder is always more or less according to the situation of the injury. As the upper part of this viscus lies within the cavity of the abdomen, being covered with the peritonæum, punctures in this part are apt to produce an extravasation

tion of urine into the belly, by which the most dangerous symptoms are commonly induced : while the under part of it, not being covered with this membrane, is often wounded without any symptom of importance taking place, as we daily observe in the operation of lithotomy as it is now practised in the lateral method.

In wounds of the under part of the bladder, all that we have to do is to dress them in the usual way with simple easy applications ; while by blood letting in proportion to the strength of the patient, by the use of gentle laxatives, and a low diet, we endeavour to prevent inflammation, the most dangerous symptom that attends injuries of this viscus. And when inflammation has already taken place, we try to remove it by farther evacuations of blood, by doses of opiates proportioned to the degree of pain, by warm fomentations to the belly, and by the semicupium. Indeed, warmth applied in this manner seems to have a more certain effect in removing the pain and tension of the abdomen, which these wounds are very apt to induce, than almost any other remedy.

When again the upper part of the bladder is injured, together with the risk which occurs from inflammation, we have the additional hazard arising from extravasation of urine.

As the danger with which this is attended is always considerable, especially when the urine passes into the abdomen, it might give the patient some farther chance of recovering, to treat wounds of this kind in the bladder upon the same principles, and in the same manner, that we have advised for wounds of the intestines ; that is, by stitching up the wounded part either with the glover's suture, or in the manner we have advised in a preceding part of this section, as may be seen in § 4. The glover's suture might answer equally well with the other ; and here it might be used with more freedom than in the intestines, as the bladder can more readily

readily admit of being somewhat diminished in its capacity.

To prevent the inconvenience and danger arising from urine being extravasated into the abdomen, it has been proposed to draw the opening in the bladder forward to the external wound, and to stitch it to the peritonæum and contiguous parts. This may be easily done when the anterior part of the bladder is wounded; but when the opening lies behind, to draw it forward and retain it at the wound would be productive of much pain, and might ultimately be attended with more danger than it was meant to prevent. In such circumstances, I would rather trust to the wound being neatly stitched up, when the parts should be immediately replaced, and the patient treated in the manner we have advised for similar injuries done to the intestines.

§ 11. *Of Wounds of the Uterus and its Appendages.*

The uterus is a strong muscular bag peculiar to the female sex, being solely intended for the fœtus. It is of a triangular figure, and is situated between the bladder and rectum. In an unimpregnated state, it lies altogether within the bones of the pelvis: but during pregnancy, it rises so high in the abdomen as to touch the umbilicus and even the stomach; while the inferior point of it, termed the Os Tincæ, terminates in the vagina, a smooth membranous sheath which runs contiguous to and terminates below the urethra.

The uterus is firmly attached by different ligaments to the contiguous parts: by the ligamenta lata on each side, which appear to be doublings of the peritonæum; and by the ligamenta rotunda, which arise from the upper corners of the fundus uteri, and passing down through the openings in the external oblique muscle, are lost in the upper part of the thigh. By the tubæ Fallopianæ, which arise near to the ligamenta rotunda, the uterus communicates with the ovaria,

two small round bodies placed within an inch and a half of its fundus.

From the uterus stretching, and occupying different parts in the different periods of gestation, it is evident that wounds, which in one state might injure it, in others will pass considerably above it : so that in judging from the situation and direction of a wound in these parts, this circumstance requires particular attention. In extensive wounds we may be determined at once by examination with the fingers, whether the uterus be injured or not : But in others, where this is not admissible, we must be directed entirely by the symptoms which take place.

In an unimpregnated state, a wound of the uterus will not be productive of symptoms very different from those which occur from wounds of the contiguous parts. But during pregnancy, wounds of this organ will either induce symptoms of an approaching abortion ; or the quantity of blood discharged outwardly by the wound, or that is extravasated into the cavity of the abdomen, will be very considerable. At least this will in all probability happen when the injury done to it is material : for during pregnancy, the quantity of blood sent to the uterus is considerable ; and we know from experience, that hemorrhagies which occur from it in this state, seldom stop till delivery is effected ; by which the uterus is allowed to contract, so as to compress and support the injured vessels.

In every injury therefore of this kind where symptoms of abortion occur, nothing should be done to prevent it ; and where they do not take place, and whenever there is reason to suspect that the patient may suffer from loss of blood, if the delivery cannot be accomplished in the usual way, the child should be taken out by the Cæsarian operation. In a subsequent part of this Work we shall have occasion to describe the method of performing this operation ; but in such cases as we are now treating of, the easiest, and  
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perhaps best, method of doing it, will be to enlarge both the external opening and the wound in the uterus to a size that will admit of the extraction of the child. In other circumstances, wounds of the uterus must be managed nearly in the same manner with other penetrating wounds of the abdomen.

Besides the several viscera in the abdomen and pelvis, which we have now treated of, there are large blood vessels and nerves which pass through them, which are also liable to be wounded: But as no remedies with which we are acquainted can afford any relief in divisions of the nerves; and as the large blood vessels here lie too deep for any surgical assistance, they very universally end fatally. A patient may indeed linger long under the paralytic symptoms which always succeed to injuries done to these nerves; but a division of the large blood vessels of the abdomen in every instance proves quickly fatal.

We have thus finished the consideration of wounds of the thorax and abdomen; and it will be observed, that we have entered minutely into it. To this I was induced, not merely by the importance of the subject, which I consider, however, as one of the most material that practitioners meet with, but with a view to excite the attention of beginners to an intimate acquaintance with the most useful part of anatomy, that of the thoracic and abdominal viscera.

In the preceding sections we have treated separately of all those wounds, which, from the situation, or any other peculiarity of the injured parts, may require any variety in the method of treatment. The extremities indeed are liable to wounds which require a mode of management that has not yet been attended to, namely, those wounds which are complicated with fractures of the contiguous bones: These, however, will fall to be considered in the Chapter on Compound Fractures. The only other varieties of wounds which we have now to speak of, are poisoned or venomous wounds, and gunshot wounds.

## SECTION XIII.

*Poisoned Wounds.*

**W**OUNDS may be poisoned in various ways: The bites of several animals, particularly those of the viper, afford examples of poisoned wounds; and the stings of the tarantula, of wasps, and bees, are of the same nature. It is evident too, that poison is conveyed to wounds by the bites of mad or enraged animals, particularly by the bites of mad dogs: And they may be poisoned by the matter or secretion of various kinds of sores, as well as by the juices of different vegetables.

The stings of wasps and bees and other insects of this climate, although they may be productive of a good deal of pain, yet seldom terminate in any symptom of importance: The application of vinegar or spirit of wine to the part affected, immediately after the injury, will often prevent that pain, tension and inflammation, which would otherwise supervene: and when once these symptoms take place, they will for the most part be more effectually relieved by washing with cold water, or by immersing the parts in it, than by any other remedy. For the sting of a scorpion, we are advised to kill the animal and apply it to the injured part, or to cover the part with a dead toad or some other animal supposed to be of a poisonous nature. There is much cause, however, to imagine, that this practice is founded in prejudice; and we are told, that of late the same remedies have been found to prove useful in the stings of insects in warm climates, that we have just mentioned for the stings of bees and other insects of this country.

As the bite of a viper proves sometimes formidable, at all times it deserves particular attention. It is true indeed, that it often heals easily without any symptom of importance taking place; for the poison of this animal being contained in a small bag at the root of each tooth,

tooth, which it can discharge or retain at pleasure, it would appear that it does not throw it out if it be not much irritated. But as we can never judge with certainty whether the wound be poisoned or not, we ought in every case to be upon our guard. To prevent the poison from entering the system is the object we should have in view. This, however, can only be accomplished when the assistance of practitioners is procured immediately: for although there is reason to suppose that some other kinds of poisons, even when applied to recent wounds, do not for several days enter the circulation; yet we know from various occurrences, that this is by no means the case with the poison of the viper, which commonly begins to operate upon the system in the space of twelve or fourteen hours. The patient complains of a violent burning pain in the injured part, which soon begins to swell. Tension and inflammation take place, not merely over the affected limb, but often over the whole body. The patient becomes faint and languid, the pulse low and feeble; he complains of giddiness, nausea, and vomiting; of a fixed pain in the region of the heart; the whole surface of the body becomes yellow like the skin of a jaundiced patient; the urine appears of a deep yellow, and is evidently strongly impregnated with bile; cold sweats take place, along with convulsive twitchings in different parts of the body; and if relief be not quickly obtained, death soon closes the scene.

With a view to prevent the accession of these symptoms, the injured part should either be cut out immediately, or should be destroyed with the actual or potential cautery. The sooner this is done, the more effectual it will probably prove; but it should always be advised as long as no bad symptom has appeared. In former times suction was much employed for the removal of every kind of poison in wounds; in some cases by instruments kept for the purpose, but most frequently by the mouth; and it was found where the

skin of the mouth was entire, that it might be done with safety. This might frequently prove successful; but where the life of a patient is so nearly concerned, that remedy only should be trusted which will with certainty prevent the poison from entering the blood. We should not hesitate therefore to advise an immediate removal of the injured part; and with a view to render the practice as effectual as possible, we should endeavour to excite a plentiful suppuration over the surface of the sore; by the application of stimulating ointments, when the patient does not complain of pain and tension; and by the use of emollient poultices, when much inflammation takes place.

But when it appears that the poison has already entered the system, this local treatment of the sore is not to be depended on. In such circumstances, the application of warm oil, not merely to the sore, but over the whole body, has been much recommended; and it is said that some advantage has been derived from the internal exhibition of it: two spoonfuls of fine olive oil, given every hour, is said to have allayed the most violent symptoms which the bite of a viper ever excites. From some late observations, however, the efficacy of this remedy is much to be doubted; and it would appear that a plentiful sweat, kept up for a considerable time, is the most certain method yet discovered, not merely of mitigating all the symptoms, but of removing them entirely. By whatever means a sweat is induced, it is found to prove useful; but experience shows, that small doses of the volatile alkali, frequently repeated, is to be more depended on for this purpose than any other remedy. A particular preparation of this kind, *eau de luce*, has been much recommended; twenty drops of it to be given every hour. But there is reason to suppose, that any other form of the volatile alkali will prove equally effectual.

All the varieties of theriac, as well as many other remedies, are recommended for the bites of vipers; nay, different remedies are advised for the bite of eve-

ry variety of this animal. But as we do not find that any of them are to be trusted, it is not necessary to enumerate them.

The most formidable wound of a poisoned nature which we meet with in this country is the bite of a mad animal : for although instances daily happen of these wounds healing without any symptom of importance ensuing, yet whenever they terminate in the hydrophobia, the utinost danger is to be dreaded. Indeed the instances of patients recovering from this dreadful symptom are so extremely rare, that we despair in every case of any of our remedies proving effectual. A variety of nostrums have been held forth to the public, by which we are told the hydrophobia may not only be prevented, but even cured when it has actually taken place. I have not heard, however, of any well attested fact of any of them proving useful.

As a preventative of the hydrophobia, nothing with which we are acquainted can be depended on but an immediate removal of the injured part, either with the scalpel or with the actual or potential cautery ; which, together with a plentiful suppuration being excited upon the sore, has in different instances appeared to answer the purpose effectually : That is, patients who have been treated in this manner have escaped, while others bit at the same time by the same animal have suffered.

The sooner that the part affected is removed after the accident, the more effectual the operation will probably prove : but it had better be done even at the distance of several days than that the patient should be deprived entirely of the chance which it affords ; and this especially as there is reason to imagine that this poison does not enter the system so quickly as a variety of others are observed to do ; at least this must be the case if we can judge from the time at which it begins to operate. For we know, that in most instances none of the symptoms induced by the bites of mad animals appear till a considerable time after the

accident: It almost always happens that several weeks intervene; and it has been known that a person has remained perfectly well after the bite for the space of six months, and at last has been suddenly seized with hydrophobia. Whenever we are certain, therefore, that a person has been bit by an enraged animal, we should advise the part to be cut out at whatever period this may be, provided no symptom has appeared of the poison having entered the system: And the fore should be kept open for a considerable time by the daily application of some irritating ointment.

While we place most confidence in this treatment, we should not neglect entirely any advantages which we are told may be derived from other remedies. Sea bathing has been much famed in all ages as a preventative of these symptoms: we have few well attested cases, however, of any benefit being procured from it. By many practitioners, mercury is much depended upon, particularly frictions with mercurial ointment, and the application of it to the fore; and as this may be employed along with any other plan of treatment that may be adopted, it may be right in every case to advise it.

It will often happen, however, that neither these nor any other means we can employ will prove effectual; and as the province of surgery affords no remedy for the symptoms which accompany the hydrophobia, as soon as they take place, the unhappy sufferer should immediately receive all the assistance which physicians of experience and observation can give.

When wounds are poisoned by the matter of diseases, as sometimes happens to surgeons in the treatment of sores, particularly of those of the venereal and cancerous kinds, the best practice would be to remove the virus immediately, in the manner we have just mentioned in cases of poisoned bites, by cutting out the part affected, or burning it with a hot iron. With respect to the venereal poison, a timid patient may indeed hesitate in the use of such a formidable remedy, when he knows that we are possessed of an antidote  
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which seldom fails: Many, however, would endure the momentary pain of a burn or a cut in preference to the slow operation of a mercurial course. And in cases of sores coming into contact with the matter of a cancer, we should not hesitate in adopting the practice immediately; for hitherto we are not possessed of any remedy upon which any dependence can be placed for the cure of this disease.

This would likewise be the most eligible practice in wounds infected with any of the vegetable poisons. We are told, however, that in those parts of the world where alone it can be necessary, that antidotes are universally known for every poison of this kind; and that the Indians, when they are wounded, can discover immediately whether the instruments with which they are hurt have been poisoned or not.

With respect to the metallic poisons, they do not at present fall within our consideration: for however deleterious they prove when taken into the stomach, they do not appear to prove otherwise hurtful when applied to wounds, than by irritating or corroding the parts with which they come in contact. We are told, indeed, that instances have occurred of these poisons entering the system even when applied to wounds; and this is mentioned as a reason for our not using the different preparations of lead with such freedom as is now universally done. But although remedies of this class are daily employed by almost every practitioner, we have not heard of a single well marked case of their proving in any degree noxious: Nay, it is to be doubted, whether even the salt or sugar of lead, as it is termed, proves hurtful, even when taken in considerable quantities into the stomach. We know that in small doses it may be used with perfect safety; and I have much reason to think that it may be taken even in large quantities with more freedom than is commonly imagined, from its having happened in different instances with patients of my own, who by mistake have

have swallowed and retained a large cupful of a strong solution of *saccharum saturni*, without any bad symptom ensuing.

## S E C T I O N XIV.

*Of Gunshot Wounds.*

AS wounds made by fire arms are supposed to be very different from every other kind of wound, they are usually treated of in separate chapters. We think it right in some measure to adhere to a custom which has long prevailed : but at the same time we must observe, that this difference consists chiefly in the symptoms being for the most part more severe and violent in gunshot wounds than in others. Till of late, most of the symptoms induced by gunshot wounds were supposed to originate from poison carried in with the ball ; and it was also imagined, that the ball cauterized or burned the parts as it passed along. We now know, however, that these opinions are both ill founded ; that the injured parts do not suffer either by poison or from the immediate application of heat ; and that all the phenomena in any respect peculiar to wounds of this kind proceed from the violent contusion produced by the passage of the ball. Of this we are rendered certain, from there being no poison contained either in gunpowder or in any of the articles of which bullets are usually made ; and from observing that symptoms of a similar nature are often induced by contused wounds produced by very different causes.

I would therefore conclude, that gunshot wounds are altogether of the contused kind ; an idea consonant to the method of cure, and which will tend to do away that mystery which has hitherto overshadowed this branch of practice. It has been a prevailing opinion, that there is something so singular in the nature of these wounds, as to render it improper for any practitioners to take the charge of them, but such as have  
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had opportunities of attending fleets and armies, and of serving as it were an apprenticeship to this branch of practice. There is no good foundation, however, for this opinion ; and I have no hesitation in saying, that gunshot wounds should be managed upon the same principles, and in the same manner, with wounds of any other kind attended with an equal degree of contusion.

In gunshot wounds, the symptoms we have most reason to dread are, inflammation, gangrene, and a suppuration so abundant as to exhaust the strength of the patient. These are therefore to be chiefly kept in view, and our practice will be more or less successful in proportion to their mildness or severity. In some cases the contusion is so violent and extensive, that the patient suffers from the injured parts being immediately attacked with gangrene. But, for the most part, inflammation is the symptom from which the greatest danger arises ; for if it be not kept moderate from the first, it is apt to terminate either in gangrene or in extensive collections of matter.

To prevent or remove inflammation should therefore be considered as our first object in every case of gunshot wound : and as nothing tends with such certainty to accomplish this as local blood letting, any veins or arteries that have been divided by the injury should be allowed to discharge freely before they are tied : Excepting indeed where some of the larger arteries have suffered, I believe it would be a good general rule for practitioners not to interfere in checking any hemorrhagy that may take place. In this they would be warranted, not merely by the known powerful effects of local blood letting in preventing inflammation in general ; but by many well attested facts, which tend to show that it proves still more particularly useful in cases of gunshot wounds. Among other proofs of this it may be mentioned, what almost every army surgeon has observed, that some of the most remarkable cures have occurred among those patients  
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who from necessity have been left for a considerable time upon the field of battle ; by which much more blood is in general lost than usually happens with such as either from their rank or other circumstances are more early taken care of. In every case therefore of gunshot wound, we should at once determine to take as much blood as the strength of the patient will permit ; and where the parts are so much contused that the vessels which have been divided do not afford a sufficient quantity, a circumstance which frequently happens, instead of taking it from the arm or any distant part of the body, it should be drawn off by the application of a proper number of leeches to the injured parts ; or when these are wanting, by cupping and scarifying the contiguous sound parts. In general, if this practice be carried a proper length at first, the accession of inflammation will be prevented ; but when it proves otherwise, and when the parts afterwards swell and inflame, the operation should be repeated once and again according to circumstances.

Our next object is to remove any extraneous body that may be lodged in the wound, as far as this can with propriety be done. When a ball has not penetrated deep, and especially when the wound is left entirely open, by a portion of skin and teguments being completely removed, there will be little difficulty in clearing away whatever might prove hurtful. But when a wound is found to run to a considerable depth, and especially if a counter opening has not been made by the ball passing out at the opposite side, any search that is made for extraneous bodies, should be done with much care and circumspection. When treating of Punctured Wounds, in Sect. III. of this Chapter, we entered upon the consideration of this point. We must now refer therefore to what was then said ; and at present shall confine ourselves to this observation, that when extraneous bodies lodged in gunshot wounds can be taken away without fretting or injuring the contiguous parts considerably, they ought always  
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to be removed immediately : but when much pain is excited, or a high degree of inflammation endangered by the attempt, we ought to desist. In such circumstances, it will be better to trust to the extraneous bodies being afterwards discharged along with the matter of the sore ; to nature pressing them out ; or to the parts in which they are lodged being accustomed to their residence. From much experience we know, that in almost every instance bullets should be allowed to remain in whatever part they are lodged, rather than that much force should be employed in extracting them. A ball lodged in the substance of a bone, is perhaps the only exception to this general rule : It cannot indeed be extracted from this situation but with much difficulty ; and therefore it is in general allowed to remain. I have known several instances of this ; but in all of them much pain and danger to the patient, as well as trouble and perplexity to the practitioner, were the consequences. The unyielding nature of bone, occasions, upon the lodgement of a foreign body in its substance, great pain, tension, and swelling over all the contiguous parts. To prevent these, the extraction of the ball, when it can be done without hazard of the patient's life, should be attempted, as soon after the accident as possible, and before the parts become swelled and pained.

Different forceps have been invented for extracting bullets from wounds, and some have proposed screws for this purpose : Scarcely any of these instruments, however, have answered the purpose for which they are intended ; and excepting where a bullet can be easily laid hold of with common forceps, no instrument of this kind should ever be employed : for besides tearing and irritating the injured parts, they are apt to catch the contiguous muscles, or other soft parts, by which much mischief must necessarily be done. There must always be a risk of this when the wound runs deep ; but it ought to be more particularly avoided in wounds of the thorax and abdomen, where  
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laying hold of any of the contiguous parts would necessarily be productive of danger. When a ball is not deeply lodged, but lies near to the mouth of the wound so that the surgeon can see it, the forceps may with safety be employed ; but whenever it lies deeper than this, if it be judged proper to extract it, a Counter Opening, as it is termed, should be made upon it, so as to admit of its being taken out with the fingers. It will commonly happen, indeed, that balls may be extracted with much more ease both to the patient and surgeon, by judicious openings of this kind, than by the use of forceps or any other instrument. The pain and terror which the making of these openings are supposed to excite, are the principal objections to them ; but it should be remembered, that in such circumstances, it is not the present ease and conveniency of the patient that so particularly merit our attention, as his future advantage and safety. Nor will the pain induced by cutting directly upon a bullet be so considerable, as by tearing it out from a deep wound with forceps.

Where the course of a ball is of a considerable length, this will always be the easiest method of taking it out, when the practice is not forbid by the contiguity of large blood vessels and nerves : But when the wound is only of a short extent, instead of cutting upon the ball, by making a small opening into it, it answers better to lay the wound open through its whole length ; by which the ball is not only more easily extracted, but the cure is afterwards much more readily accomplished. Indeed this practice should be adopted in all such cases, even when the ball is not lodged. When the two openings made by the entrance and exit of a ball are not very distant from each other, and when with safety they can be laid into one, it should always be done as soon as possible after the accident ; by which the vessels which have been injured will be more freely unloaded than they could possibly be in any other manner ; every kind of extraneous matter  
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that the ball may have carried in, will be brought into view ; and the sides of the sinus being allowed to collapse, the size of the sore will thus be diminished.

This being done, the parts affected should be covered with a pledgit of any emollient ointment formed merely of wax and oil, and a poultice of bread and milk should be laid over the whole : a practice which proves much more successful, as well as more agreeable, than the application of warm stimulating dressings ; which, till of late, were universally used in every case of gunshot wound. The pain and irritability which almost uniformly attend injuries of this kind, point out the propriety of the most soothing applications. For the most part those we have mentioned answer the purpose : but in some cases the preparations of lead answer better ; particularly Goulard's cerate, or the common wax ointment, impregnated with a small proportion of *Saccharum Saturni*. An opiate should now be administered ; and the part affected being placed in the easiest and most convenient posture, the patient should be laid to rest.

The formation of matter in every sore attended with contusion, is an object of the first importance ; for till this takes place, there is often reason to suspect that gangrene may supervene. With a view to hasten it, the warm poultices should be frequently renewed : and they should be continued till the tension and swelling with which wounds of this kind are usually attended be removed, and till the sore has acquired a red healthy granulating appearance ; when it will fall to be treated in the manner we have already advised for sores proceeding from any other cause.

Gunshot wounds are commonly described as being covered from the first with deep sloughs or escars ; and various remedies are advised for removing them. Every appearance, however, of this kind with which they are attended, proceeds entirely from contusion ; and excepting the injury be large and extensive, the slough covering the wound is not often perceptible ; or it is  
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so thin and inconsiderable, that it dissolves and comes away with the matter of the first or second dressing. In such cases, therefore, it requires no particular attention. And even when it runs to a greater depth, it commonly separates so as to be easily removed as soon as a free formation of matter has taken place: for every slough of this kind is a real mortified spot; and we have elsewhere shewn that nothing tends to separate mortified parts with such certainty from those that are sound, as a free suppuration being induced upon them.

In the early stages of gunshot wounds, emollient poultices prove more useful than perhaps any other remedy: But it is necessary to remark, that they should not be continued after the effects we have mentioned are produced: for when they are too long persisted in, they not only tend to relax the parts too much, and to render them soft and spongy, but are apt to induce too copious a formation of matter; from which the patient is now in greater danger than from any other circumstances attending his situation: For although it is a point of the utmost importance in every gunshot wound, to encourage the formation of pus to a certain extent; yet we find universally, that in great quantities it proves very prejudicial, and when once excited, that it is with much difficulty checked. We think it also right to observe, that this superabundance of matter is very apt to proceed from a different cause, from the inflammation being allowed to run too high, by which extensive effusions and consequent abscesses take place among the contiguous muscles. This cannot in any way be so effectually prevented as by very copious bleedings immediately after the injury is inflicted: It is chiefly with a view indeed to prevent this distressful occurrence, that we have advised the practice of early and copious blood letting in every case of this kind; and with those who have had opportunities of seeing the inconveniences which arise from those extensive suppurations that ensue from neglecting it,

no other argument will be required to show the propriety of adopting it.

In whatever manner a too copious flow of matter has been induced, the practice to be adopted must be the same. Every collection that appears must be discharged by a depending opening; the limb should be laid in that posture which will most readily admit of its running off; the patient should be supported by a light nourishing diet; and the bark should be plentifully exhibited. It is in this state indeed of gunshot wounds that bark acts with most advantage; when the inflammatory symptoms are mostly gone, and when the patient is suffering from too copious a discharge. In this situation it often proves highly serviceable; but in order to act with advantage, it should be given in considerable quantities. Elixir of vitriol proves in such cases a powerful addition to bark.

When notwithstanding a liberal use of these medicines, and a proper attention to the other circumstances we have mentioned, the discharge still continues copious, we will often find that it is kept up by detached pieces of bone, or by pieces of cloth, or some other extraneous body having been carried in with the bullet. In such circumstances, nothing will tend to lessen the quantity of matter till the extraneous body be removed; for while it remains, it will irritate and inflame the contiguous parts, and effusion and suppuration will be the consequence. The sore ought therefore to be again examined; and any loose body or detached pieces of bone that are discovered, should be immediately removed. When the irritation is kept up by pieces of cloth, as they are too soft to be discovered by the probe, they are apt to pass unnoticed. When there is therefore reason to suspect that any article of this kind is lodged in a sore, some other method is necessary for extracting it: And when the parts are so situated that a cord or seton can be introduced along the passage made by the ball, nothing will more readily prove successful.

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cessful. I have met with different instances of pieces of cloth being brought out with the daily drawing of a cord, which were not suspected to be lodged ; and in consequence of which the sores were soon cured, after various attempts to heal them had been made in vain.

We have already advised opium as an useful medicine in the early stages of gunshot wounds ; and by tending more effectually than any other remedy to abate irritation, it proves often serviceable in lessening the discharge of these sores, even when they have been of long duration, and when various other medicines have been employed without any advantage. It ought therefore to be prescribed with freedom whenever the discharge appears to be kept up by pain or irritation.

Although in gunshot wounds hemorrhagies of importance do not always succeed the accident immediately, yet they sometimes take place afterwards. This seems to proceed from the arteries being left open and exposed, when the mortified slough which contusions usually produce falls off. About this time therefore, practitioners should be much on their guard against such an occurrence, and this especially when the injury is extensive or seated near to any large artery. The hemorrhagy is often preceded by a great heat in the injured parts, and with a throbbing pulsatory pain. At this period it may frequently be prevented by plentiful blood letting, and especially by the application of leeches to the contiguous parts ; but when once the hemorrhagy appears, nothing will prove successful, if the vessels are of any considerable size, but a proper application of ligatures. As the discharge in these cases is often so sudden and violent as to induce much hazard before the assistance of a practitioner can be procured, patients in such circumstances should be furnished with a tourniquet, with directions to the servant in attendance to apply it immediately on the first appearance of blood.

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Hitherto we have not mentioned the scarifying of gunshot wounds; a practice which we find recommended by almost every writer upon this subject, and which till of late prevailed very universally. By scarifying the fores, it was expected that the sloughs with which they are sometimes covered would sooner separate, and that the cure would thereby be hastened. Later experience, however, shows that this reasoning is fallacious; and instead of proving useful, that scarifying very commonly does harm: It creates additional pain and inflammation, at the same time that it evidently extends the surface of the sore, while it does not appear to be productive of any advantage. It should therefore be laid altogether aside. Even the dilatation of gunshot wounds, so much recommended of late, ought to be employed with caution. When the passage of a ball is not extensive, and when the parts through which it has gone can with safety be laid open, I believe it would be right in every case to do it with freedom from one end of the sinus to the other: no harm could accrue from it; and there is reason to imagine, as we have observed above, that it would tend much to forward the cure: But I have never been able to discover what advantages could probably be derived from the mere dilatation of the external opening of a gunshot wound: It is proposed with a view to give a more free discharge to the matter than it would otherwise have: But in deep narrow wounds, formed by pistol or musket bullets, increasing the diameter of one part of the sinus will have no effect whatever upon the the rest of it; and as it must evidently do harm by enlarging the wound, while no benefit can probably accrue from it, I do not hesitate in saying that the practice should not be continued. In such cases, where the wound is either so situated that it would be dangerous to lay it open from one end to the other, or where it is of too great extent for this practice to be adopted, the passing a cord, as we have already advised, along the sinus, will often answer our purpose. This,

however, should never be attempted till the first or inflammatory stage of the wound is over : for while any degree of pain or tension remains, the irritation produced by the cord is very apt to do harm.

But it sometimes happens even that a cord cannot be employed, owing to the situation and direction of the wound. In such cases, after the pain, tension, and other symptoms of inflammation are removed, and a free suppuration is induced, the sore must be treated in the manner we have already advised when speaking of punctured wounds : a proper application of pressure along the course of the sinus will, in such a situation, often effect a cure when it cannot be obtained in any other manner.

It might be expected, that something should be said of the method of managing mortification when it occurs in gunshot wounds ; but it appears to be unnecessary, as we have elsewhere treated fully of this symptom as a consequence of inflammation.\* I think it right, however, to remark, that in gunshot wounds nothing in general proves so effectual in preventing mortification as plentiful evacuations of blood. It will not indeed prevent those parts from mortifying which have been severely contused by the ball coming immediately into contact with them : but this is not what in such cases we have most reason to dread ; for the gangrene which occurs from the contusion produced by the ball, is commonly circumscribed, and it is not apt to spread. It is that variety of gangrene which succeeds to the inflammatory stage of gunshot wounds, of which we have most cause to be afraid. But when blood letting is freely practised, it seldom takes place ; or if it does appear, the same remedy will often prevent it from spreading.

As bark is found useful in many cases of mortification, it is almost universally employed in gangrene arising from gunshot wounds. I am satisfied, however, that the practice is often founded in error, and that  
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\* Vide Treatise on Ulcers, &c. Part I.

much mischief has been done by it. When gangrene occurs in a weak debilitated habit, bark may always be given with safety ; and in such circumstances it will often prove to be the most effectual remedy. But mortification which takes place from gunshot wounds happens most frequently in strong plethoric patients, where tonics of every kind prove prejudicial, and where blood letting and other evacuations are particularly useful. In the subsequent stages even of this variety of gangrene, if the disease appears to spread after all the symptoms of plethora and inflammation are removed, bark may be employed with propriety ; and in such circumstances it should be exhibited with freedom ; but it should never be given while the inflammatory tension and pain continue.

In offering these observations upon gunshot wounds, we have hitherto been supposing that the injury is in some degree circumscribed, or at least that it is not so extensive as to preclude hopes of saving the limb in which it may be situated ; and it is proper to remark, that by due care and attention, wounds of this kind may be often cured, and limbs saved, where the first appearances were even very alarming. But when a limb is injured in such a manner that there is no reasonable hope of saving it, it would be improper to persist long either in these or any other means of cure that have yet been proposed. By doing so, the patient must suffer unnecessary pain and trouble, while at the same time his constitution may be so much injured as to deprive him even of a chance of recovery upon the removal of the limb. But the attempt to save limbs which have suffered much by gunshot wounds, gives rise to a question of importance, which merits particular discussion.

In the various battles which occurred in the last German war, the number of wounded men was often surprisingly great ; of course the amputation of limbs became frequently necessary. By many it was imagined that the practice was carried much farther than it

ought to have been ; and it was even alleged, that limbs were often wantonly removed, which with much ease and safety might have been saved. Among others who were of this opinion, Mr. Bilguer, surgeon to the armies of his Prussian Majesty, wrote a treatise, in which he endeavours to prove, that amputation of limbs is very rarely necessary, as almost every injury for which it is usually advised will admit, he thinks, of a cure, by more gentle means.

As the removal of a limb should never be attempted but in cases of real necessity, the public at large were much indebted to Mr. Bilguer for endeavouring to prevent a too general practice of it. There is much cause, however, to imagine, that the zeal with which he appears to be animated has made him carry his restrictions too far ; and that numbers would suffer much unnecessary pain, trouble, and hazard, were they to be generally adopted.

Mr. Bilguer thinks, that scarcely any case of gunshot wound can be so bad as to require amputation. Even where the softer parts are much lacerated, and the bones and the joints much injured, we ought always, he thinks, to attempt to save the limb : and he asserts, that by this practice more lives will be preserved than by the usual method of proceeding immediately to amputate. After all the attention, however, that I have been able to give to a subject of such importance, in the course of my own practice, and after much information obtained from others of experience and observation, I am of opinion, that a great deal of mischief would be done by admitting this as an universal rule. I would advise, in every case where the fleshy parts of a limb only are merely divided, to make some trials for saving it ; and they will often prove successful. Where all the muscular parts of a limb are much contused and lacerated, it would no doubt be in vain to attempt the cure of it ; on the contrary, it should be removed at once. But when any considerable portion of soft parts remains unhurt, although the others  
should

should be injured in the severest manner, if none of the large joints have suffered, we should never despair of being able to save the limb. The contused parts may indeed mortify and throw off, and thus an extensive sore will be produced : but we know from daily experience, that the largest sores will heal ; and if in this we should be disappointed, we still have it in our power to advise amputation, while both the patient and surgeon have the satisfaction to think that nothing has been omitted that could probably have prevented the necessity of employing a remedy of such a disagreeable nature. And on the subject of Amputation we shall afterwards have occasion to show, that in such a situation the operation proves usually more successful when a sore has been of some duration, than when employed immediately after the accident.

But when any of the larger joints have been much injured by the ends of the bones which compose them being shattered or splintered, immediate amputation should always be advised : for the inflammation which succeeds to these wounds comes on quickly ; and when once it takes place, the operation can never be employed till it be altogether removed. The height to which inflammation is in such cases apt to proceed, is a powerful argument in favour of early amputation : for when the large joints are materially hurt, the parts soon become highly inflamed, notwithstanding of all that we can do to prevent it ; so that no time should be lost in putting the operation in practice. It must indeed be allowed, that out of a great number of patients, some few might in such circumstances have their limbs saved, even where the joints have suffered in the worst manner : But we cannot allow, with Mr. Billguer, that this is a sufficient reason for the practice which he recommends being generally admitted. It is not the success which may attend a few cases, by which practitioners should be directed, but that which ensues from a general course of practice. And this I think may be considered as certain, that in such cir-

cumstances as we are now considering, more lives would be lost by attempting to save the limbs of patients, than by removing them as quickly as possible after the injuries have been received ; at the same time that the practice would be attended with much less trouble and pain to the patient : for the sore which remains after the removal of a limb is trifling indeed, when compared with extensive lacerated wounds of the large joints. In the present improved method of operating, the former often heals in the course of two or three weeks ; whereas wounds in the joints, even when they terminate most favourably, often continue obstinate, and produce much perplexity and distress for several months, or even for years.

With respect to fractured bones in cases of gunshot wounds, when a large bone is fractured or splintered through its whole extent, and when this is accompanied with much laceration of the corresponding soft parts, immediate amputation of the limb will be the safest practice, and ought therefore to be advised without hesitation. But where a gunshot wound that is not very extensive is merely accompanied with a simple fracture of a contiguous bone, or even where the bone is fractured in different places, if the injury does not extend to the joint, we ought in perhaps every instance to endeavour to save the limb. By removing the detached pieces of bone, and treating the sore with attention, we will often have the satisfaction of accomplishing a cure, and of restoring patients to the use of their limbs, who otherwise might have remained lame for life, or who might have been deprived of them entirely.

It is proper, however, to remark, that although this should always be attempted where a patient is to remain in a fixed situation, and where the regular attendance of a practitioner can be procured, yet after engagements, whether at sea or land, where the wounded must be frequently moved about, and where  
there

there is commonly a deficiency of surgeons, I believe it would be a good general rule to proceed to immediate amputation in every case of gunshot wound accompanied with a fracture of any of the contiguous large bones. By doing so, a few limbs would possibly be removed, which with great care and attention might have been preserved; but I am convinced that more lives would be saved by it than by attempting in such circumstances to pursue any other method of treatment. We shall have occasion, however, to enter more fully upon the consideration of this subject in the Chapter upon Amputation.

## CHAPTER

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## CHAPTER XXXVII.

### *Of Burns.*

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**B**URNS assume different appearances according to their degrees of violence, and to the manner in which they are produced. Thus, burns which merely irritate the surface of the skin differ materially from those which corrode or destroy it; while those again have a different aspect from such as affect the more deep seated parts, as the muscles, tendons, ligaments, &c. And we know that such as occur from the application of boiling water, or any other liquid, differ materially from those which are produced by the direct contact of hot metallic bodies, or of burning combustible materials.

Burns which do not destroy the cuticle, and which irritate the skin only, act nearly in the same manner with cantharides and other vesicantia. The irritation which they excite produces an increased action in the exhaling vessels of the affected part, by which vesications are formed in extent and number proportioned to the violence of the cause. But when the skin or subjacent parts are destroyed, no vesicles take place. A black mortified slough is first observed; and when this separates and is thrown off, an ulcer is left of a depth corresponding to the degree of heat by which it was produced.

In every case of burn the pain is severe; but in general it may be observed, that it is more considerable where the skin has been merely much fretted or irritated, than where such a degree of heat is applied as to destroy it entirely.

In deep extensive burns, mortification sometimes takes place to an alarming degree very soon after the injury is inflicted; but for the most part the symptom we have most cause to dread is inflammation. The pain and irritation which burns excite, are in some instances

stances so violent, that all our efforts are apt to fail in preventing them from inducing the very highest degree of inflammation : And when the surface of a burned part is extensive, the effects of this inflammation are not confined to the spot which has more immediately suffered ; they are apt to excite fever ; and in many cases such a degree of torpor is induced, as at last ends in death.

In the treatment of every variety of burn, our first object should be to procure ease as quickly as possible. Where the skin is not destroyed, but seems to suffer merely from irritation, an abatement of pain may be procured by the application of remedies of very different, and even of very opposite natures : By dipping the part affected in very cold water, and keeping it for some time immersed in it, the pain will often be rendered very supportable ; while on the other hand, a considerable degree of ease may be procured by plunging the injured part suddenly into boiling water, or any other fluid of nearly an equal degree of heat. E-mollients are often employed, and in some cases they procure immediate relief ; but in general, astringent applications prove much more successful. One of the best applications to every burn of this kind, is strong brandy, or any other ardent spirits : it seems to induce a momentary additional pain ; but this soon subsides, and is succeeded by an agreeable soothing sensation. It proves most effectual when the parts can be kept immersed in it ; but when this cannot be done, they should be kept constantly moist with pieces of soft old linen soaked in spirits. The *Acetum Lythargyrites*, a strong solution of *Saccharum Saturni*, or Goulard's saturnine water, make useful applications for the same purpose ; and as a proof that it is the astringency of the remedy which the effects result from, the same benefit is derived from a strong solution of alum, or even from common ink.

It is the common opinion, that remedies of this kind prove chiefly useful by preventing those vesications or serous exsudations which superficial burns are usually

usually attended with : But I do not find that the observation is well founded ; for I have always remarked, that they procure an abatement of the pain sooner where these vesications have already appeared, than when they are employed so early as to prevent them from rising, which they frequently do when they are applied immediately after a burn is inflicted.

Whatever remedy we employ, it ought to be persisted in as long as the pain continues ; and in extensive burns, where the irritation is great, along with external applications, opium should be prescribed in doses adequate to the degree of pain. Even that stupor with which patients in this situation are sometimes attacked, is more readily removed by opium than by any other remedy. As this symptom is probably induced by some degree of effusion upon the brain, and as we are to consider this as an effect of the irritation which always accompanies burns, we may readily conceive that opiates should prove particularly useful in removing it ; And I have found in a variety of instances that they do so.

With respect to the management of the vesications ; by some we are advised to open them immediately, while others assert that they should never be meddled with. In judging from my own observation, I would say that they should never be opened till the pain arising from the burn is entirely gone : for during this period, the least access of air is attended with a great deal of uneasiness. But when the irritation produced by the burn is subsided, they may be opened with safety : and at this period it ought always to be done ; for when the serum is allowed to rest long upon the skin beneath, it is apt to render it tender, and even to induce some degree of ulceration, which might with ease be prevented. Even at this time the vesicles should be opened with small punctures instead of large incisions, so that as little air may be admitted as possible. And after the serum is discharged, the best application that can be made to the part is a thin liniment of wax and oil, with a small proportion of *Saccharum Saturni*.

ni. Oil by itself is too thin, as it runs quickly off; and ointments of the usual consistence give more pain than a liniment, as their stiffness prevents them either from being applied or removed so easily.

In this manner all such burns as we are now treating of, may in general be cured, excepting where they are so extensive as by the irritation which they produce to excite much inflammation and fever. In such circumstances, blood letting, and other remedies adapted to the particular symptoms, must be advised; and when the injured part is found to ulcerate, which will often happen in severe burns, even where the skin remained entire for several days, those remedies must be employed which the nature of the sore may appear to render necessary, and for which we must refer to the different sections of a former publication.\*

When, again, burns are from the first attended with loss of substance, as usually happens when they are produced by the application of hot metallic bodies, cooling emollient applications prove most effectual, the part being kept constantly moist with a liniment composed of equal parts of lime water and linseed oil often gives immediate ease; and the easiest way of applying it is, to daub the parts frequently over with a soft pencil well soaked in it. The application and removal even of the softest coverings is often productive of much pain; and I have always found in burns of this kind, that their being exposed to the air does not for the first two or three days do any harm: On the contrary, it often gives relief when no advantage is derived from any application. But as soon as the pain and irritation produced by the burn are removed, the parts should be covered and treated in the same manner as ulcers proceeding from any other cause. The liniment I have mentioned of lime water and linseed oil, is perhaps the best application that has yet been employed in burns of this kind. In some cases, however, I have found that more immediate ease has been procured from the application of Goulard's Cerate;

or

\* Vide Treatise on Ulcers, &c.

or the Unguentum Nutritum; and a weak solution of Saccharum Saturni has sometimes proved successful.

In burns arising from the explosion of gun powder, some of the grains of the powder are apt to be forced into the cutis. At first they produce much irritation; and if they be not removed, they commonly leave marks, which afterwards continue fixed and permanent. They should therefore be picked out with the point of a needle, or any other small instrument, as soon as possible after the accident; and with a view to prevent inflammation, as well as to dissolve and carry off any particles of the powder which might remain, the parts affected should be kept covered for a day or two with emollient poultices. In other respects, injuries of this kind are to be treated in a similar manner with burns produced in any other way.

When parts which lie contiguous are burnt, they are apt to adhere to each other, if some pains be not taken to prevent them. This is more particularly the case with the fingers and toes, and with the nostrils and palpebræ. The surest method of preventing it, is to keep pledgits covered with any proper dressings inserted between them during the course of the cure.

In the treatment of ulcers arising from burns, it is proper to remark, that the parts are very apt to become soft and fungous, and to rise considerably above their natural level. When this is observed, any emollient applications that may have been previously used should be laid aside; such as are moderately astringent should be employed instead of them; and gentle compression with a roller proves particularly useful. Bathing the parts with a common Saturnine wash, or with lime water, or a solution of alum, often proves serviceable; and one of the best ointments for this purpose is the common Ceratum e Lapide Calaminare. By persisting in these means, any fungous excrescences of this kind will, for the most part, be soon removed; but when they prove obstinate, they must be taken down by the application of burnt alum, blue vitriol, or lunar caustic.

## EXPLANATION OF THE PLATES.

### Plate XXXIX.

[Opposite to page 15.]

Fig 1. The knife which Mr. Pellier commonly employs in extracting the cataract. It should be highly polished, and so very sharp as to penetrate the eye with ease; at the same time that it should be of a sufficient strength for dividing the cornea without yielding. This, as well as the other two knives in this plate, are made to fit the handle I represented in Plate XLI. fig. 2.

Fig. 2. A knife exactly of the same form and size with the other; only in this, that side which passes next the iris is round or convex, with a view to protect that membrane from being injured, which it is apt to be when the common flat knife is employed in eyes that are not prominent.

Fig. 3. A probe pointed knife, which in some cases may be employed with advantage for finishing the operation, when by any accident the aqueous humour escapes before the point of the other knife has pierced the opposite side of the cornea: But for a more particular account of the method of using it, we must refer to page 18.

Fig. 4. A pair of curved scissors of a proper size for every operation on the eyes where scissors are needed: Indeed every operator who practises much in this branch should be provided with them.

Fig. 5. This is the only speculum which Mr. Pellier employs. It may be made of gold or silver wire, or of any other metal. It is here represented of the full size both in length and in thickness of wire. In using it, one of the curves at *A* or *B* is placed upon the upper eyelid directly behind the cartilaginous boarder;

boarder; and being given to an assistant, a degree of force is applied with it sufficient for fixing the eye; which is easily done, if the operator at the same time makes some resistance by placing the index and middle fingers of one hand on the under edge of the orbit so as to compress the eye beneath.

All the instruments of this plate are represented of the full size.

## PLATE XL.

[Opposite to page 24.]

Fig. 1. A curved needle fixed in a handle for the purpose of passing ligatures beneath the pterigium and other small excrescences, which now and then occur within the orbit, and even upon the eye itself. I have elsewhere shown that they may be removed without this precaution;\* but as Mr. Pellier is accustomed to employ a ligature, I think it right to describe his method of inserting it. Fig. 1. is intended for tumors on the right eye, and to be used with the left hand of the surgeon. Fig. 4. is for the left eye, and to be used with the right hand.

Figs. 2. and 3. An instrument which Mr. Pellier names a *Cistatome*, from his using it in particular cases for opening the capsule of the crystalline lens. It may be made of gold or any other metal. In using it, he holds it between the thumb and two fore fingers of his right hand; taking care to place the thumb upon the button *A* or *C*, which is connected with a sheath that covers the sharp point *B*. The hand being supported upon the cheek by the ring finger and little finger, the point of the instrument covered with the sheath must be cautiously passed through the pupil till it reaches the lens; when the button *C* being drawn back with the thumb, the point of the instrument will thus be set at liberty without the hand being moved. This is an ingenious invention, and answers the purpose with ease and safety.

These instruments are all represented of the full size.

PLATE

\* Vide Chap. XXVII. Sect. VIII.

## PLATE XLI.

[Opposite to page 30.]

Fig. 1. An instrument for depressing the under eye lid. When an assistant cannot be procured, it may often prove useful. The two flat hooks at the upper end of it being fixed upon the cartilaginous edge of the eyelid, the other end of it hanging over the cheek, by its weight draws it considerably down.

Fig. 2. A knife which Mr. Pellier employs in some cases for the operation of extracting the cataract. It is fixed in the handle at *B* by a male screw fitted to a female screw, which is turned by the nut *A*. This handle may be made to answer figures 4. and 5. as well as every knife employed in operations on the eyes.

Fig. 3. An instrument for determining the quantity of skin to be removed in the operation for the Trichiasis or Inversion of the eyelids. When it is found necessary to remove a portion of skin from beneath the under eyelid, or from the superior part of the upper palpebra, it may be done with a common scalpel, while an assistant supports or elevates it from the parts beneath either with his fingers alone or with forceps made for the purpose; but this instrument answers better, as by means of it the quantity of parts to be removed can be ascertained and cut off with more precision.

Fig. 4. A knife for opening small collections of matter on any part of the eyeball. Being blunt on the back and round on the end, it is used without any risk of injuring the contiguous parts.

Fig. 5. A sharp pointed curved knife, for dividing the vessels of the eye or of the palpebræ.

These instruments are all delineated of the full size.

## PLATE XLII.

[Opposite to page 33.]

Fig. 1. A small scoop, which answers better than any other instrument for removing small stones, peas, or any other substances from the nostrils or ears.

Figs. 2. 3. 4. 5. and 6. Are instruments employed by Mr. Pellier for the operation of the Fistula Lacrymalis. Fig. 2. is a perforator and conductor for clearing the passage through the os unguis into the nose. Figs. 5. and 6. are tubes for leaving in the passage. Fig. 3. is a compressor for fixing them after they are inserted; and the easiest method of inserting a tube is by putting it upon the conductor after it is passed through the compressor, as is represented in fig. 4. The conductor armed with the tube and the compressor being passed through the passage into the nose must be withdrawn; when, by means of the compressor, the tube may be firmly fixed.

These instruments are all represented of the full size.

### PLATE XLIII.

[Opposite to page 42.]

Fig. 1. Forceps of a convenient form for extracting small bones or other substances from the throat.

Fig. 2. An instrument for preventing the trachea from collapsing after the operation described in page 42. *A B*, Two moveable tubes for inserting into the trachea, to be retained in their situation by a ribbon passed through the openings *C D*, and tied on the back part of the head.

Fig. 3. A side view of one of the tubes.

These instruments are all represented of the full size. They, as well as some others in this plate, are taken from some elegant engravings published by Mr. Bamberger of Vienna.

### PLATE XLIV.

[Opposite to page 60.]

Fig. 1. A double canula for the purpose of applying ligatures upon polypous excrescences either in the nose, throat, ears, or vagina. The ligatures passed through it may either be of catgut or platinum wire.

Fig. 4. Is a canula for the same purpose, but of a different construction. When the other is used, the ligature is tied round the handles of the instrument. In this the ligature passes through a moveable handle, and is easily turned to any degree of tightness.

Fig. 2. Is a canula of the same kind with the others; but being crooked, it is better calculated for removing polypi that are deeply seated in the throat. The method of using these instruments is described in different parts of Section V. Chapter XXVII.

Fig. 3. Is an instrument for passing a ligature over the uvula. A thread being passed through the tubular part of the handle with the probe *A*, a noose must be formed upon it; and being lodged in the groove on the inside of the ring, the other end of the thread must be passed through the two small holes on the outsides of the ring; and thus it is ready for use. It is commonly termed the Ring of Hildanus, from the name of its inventor. All these instruments are represented of the full size.

PLATE XLV.

[Opposite to page 64.]

Fig. 1. A section of the bones of the head, representing a polypus in the throat hanging down behind the velum pendulum palati, with a ligature passed over it and fixed at the root of it, with a double canula inserted through one of the nostrils.

Fig. 2. This figure is taken from Mr. Cheselden. It represents a polypus in the nose, with part of it passing back into the throat, and the rest into the nostril, with a ligature inserted from the nostril into the throat, in such a manner as to include the root of the excrescence in its doubling. By afterwards twisting the ends of it, a degree of compression may be applied upon the root of the polypus sufficient for removing it; but it would not answer in every case; and as the method with the canula is not only more easy but more effectual, the other will never probably be used.

## PLATE XLVI.

[Opposite to page 65.]

Fig. 1. A polypus of such a size that it distended the nostril completely. It was removed with a ligature as is here represented. *A*, The extremity of the polypus which appeared without the nostril. *C*, a probe of silver or any other metal, split at the end, in such a manner as to retain a piece of catgut or silver wire; the doubling of which being inserted into it, should be pushed up to the root of the polypus on one side, while the tube *B* being passed upon the two ends of it, must be pushed up to the root of it on the opposite side, when the ligature may be easily drawn to any necessary degree of tightness.

Fig. 3. A slit-curved probe, which may be used for the same purpose, viz. for applying a ligature to the root of a polypus in tumors seated in the throat. By this simple invention a ligature may be carried to the root of every polypus that can occur, however much the nostril may be distended by it.

## PLATE XLVII.

[Opposite to page 66.]

Fig. 1. An instrument for the purpose of applying caustic to any part of the mouth or throat. It may be made of silver or any other metal. *A*, A moveable tube in which the caustic must be fixed, when by pulling the ring at the other end, it must be drawn so far into the surrounding canula as to be completely covered with it; when the end of the instrument being applied upon the part affected, the caustic must be again pushed forward to a proper length, which may be always ascertained with exactness by means of the small pin tied by a thread to the ring at the opposite end of it. This, as well as the instruments of Plate XLVI. I am favoured with by Dr. Monro, whose improvements in surgery are numerous and important.

Figs.

Figs. 2. 3. and 4. Are different parts of an instrument mentioned in page 61 for the purpose of putting a ligature round a polypus in the throat.

Fig. 2. A waxed thread with a noose adapted to the size of the groove in the ring *CD*, fig. 3. *ED*, *EC*, Two tubular pieces of brass, two inches and a half long, supporting the ring which is placed horizontally upon them. At the upper ends of each they should be made perfectly smooth and round, so as to allow the thread to slide more easily, and to prevent it from being cut by the edges of the tubes. *CD*, The apertures where the ends of the thread are inserted. *E*, one of the openings at which they are brought out. The other opening cannot be seen in this view of the instrument. The handle of the instrument is of strong brass wire seven or eight inches long, and is bent a little that it may be the more easily introduced.

Fig. 4. An instrument for making a second noose. *F*, Two brass wheels fixed in a small case of brass. The two wheels are five eighths of an inch broad, and half an inch deep. After forming a second noose, the ends of the thread should be passed over the wheels in the manner here represented, when the handle of the instrument being pushed upwards, a knot may be formed of any degree of tightness.

This instrument is evidently formed upon the same principle with the ring of Hildanus, Plate XLIV. fig. 3.

# PLATE XLVIII.

[Opposite to page 68.]

Fig. 1. Curved forceps for extracting polypi from the throat, and from behind the velum pendulum palati.

Fig. 2. Straight forceps for extracting polypi from the nostrils.

Fig. 3. Forceps for the same purpose with the last, but somewhat different in form. The method of using both these and the others is described in Chap. XXVIII. Sect. V.

## PLATE XLIX.

[Opposite to page 77.]

Figs. 1. 2. and 3. Different forms of curved scissors for extirpating tumors within the mouth, as well as for other purposes.

Fig. 4. An instrument nearly of the form of a fleme, which answers better than any other for scarifying the gums of children in dentition.

## PLATE L.

[Opposite to page 82.]

Fig. 1. A scarificator for separating the gums from the roots of teeth intended to be extracted; It should be very sharp, but at the same time not so fine in the point or edge as to be hurt by being insinuated between the gums and the teeth.

Fig. 2. A curved trocar for perforating the antrum maxillare.

Figs. 3. and 4. Two dissecting hooks with two and three prongs, which answer better for many purposes than the single pronged hook in common use.

## PLATE LI.

[Opposite to page 85.]

Fig. 1. An instrument for passing a ligature round the uvula or any other pendulous excrescence in the throat; but although the proposal is ingenious, it does not answer the purpose so well as the instruments delineated in Plate XLIV. figs. 1. 2. 3. and 4.

Fig. 2. An instrument first proposed by Mr. Cheselden for tying a knot upon schirrous amygdalæ after passing a ligature through the basis of the tumors, in the manner represented in fig. 3. The pin in fig. 2. is meant to represent a part upon which a knot is to be formed.

## PLATE LII.

[Opposite to page 87.]

Fig. 1. An instrument for removing the uvula by excision. That part of the uvula intended to be removed

moved being passed through the opening in the body of the instrument, the cutting slider, which ought to be very sharp, must be pressed forward with sufficient firmness for dividing it from the parts above.

Fig. 3. A curved probe pointed bistoury for removing small tumors in the throat or any part of the mouth : And fig. 2. forceps for laying hold of tumors intended to be removed in this manner.

PLATE LIII.

[Opposite to page 90.]

Figs. 1. and 2. Two scarificators of different forms for opening abscesses in the throat, and for scarifying the amygdalæ. The two wings with which the canula of fig. 1. is furnished, are intended for compressing the tongue, while the point of the instrument is passed more deeply into the throat.

Figs. 2. and 4. Mr. Mudge's machine for conveying steams of warm water and other liquids to the throat and breast. Fig. 2. The inhaler as it appears when fitted for use, except that the grating *A*, which then ought to cover the hole, is now turned back, to show the opening into the valve. Fig. 4. A section of the cover, in which is shown the construction of the cork valve *B*, and also the conical part *C*, into which the flexible tube *D* is fixed.

When the inhaler, which holds about a pint, after being three parts filled with hot water, is fixed at the arm pit under the bed clothes, the end of the tube *E* is to be applied to the mouth ; the air, in the act of inspiration, then rushes into the apertures *F*, and passing through the hollow handle, and afterwards into a hole in the lower part, where it is soldered to the body, and therefore cannot be represented, it rises through the hot water, and is received into the lungs, impregnated with vapour. In expiration, the contents of the lungs are discharged upon the surface of the water ; and instead of forcing the water back through the hollow handle, the air escapes by lifting

the round light cork valve *B*, so as to settle upon the surface of the body under the bed clothes.

Thus the whole act of respiration is performed, without removing the instrument from the mouth.

The flexible part of the tube *D* is about six inches long, fitted with a wooden mouth piece *E* at one end, and a part *G* of the same materials at the other, to be received into the cone *C* on the cover. This flexible tube is made by winding a long slip of silk oil skin over a spiral brass wire. This should be then covered with one of the same size, of thin silk, and both be secured by strong sewing silk wound spirally round them. Some length and degree of flexibility is necessary to this tube, for the sake of a convenient accommodation to the mouth when the head is laid on the pillow.

Care should be taken by the workman, that the cover be made to fit very exactly ; or, if it does not do so, the defect should be remedied by winding a piece of cotton wick, or some such contrivance, round the rim underneath the cover, so as to make it air tight. The cork, likewise, which forms the valve, should, for the same reason, be made as round as possible. It is also necessary to remark, that the area of the holes on the upper part of the handle taken together ; the size of the hole in the lower part of the handle which opens into the inhaler ; the opening of the conical valve itself ; and that in the mouth piece ; as well as the cavity or inside of the flexible tube, should be all equally large, and of such dimensions, as to equal the size of both nostrils taken together : in short, they should be severally so large, as not only not to obstruct each other, but that respiration may be performed through them with no more labour than is exerted in ordinary breathing.

#### PLATE LIV:

[Opposite to page 106.]

Fig. 1. A speculum oris, which I proposed a considerable time ago, and which in different cases has been

been used with advantage. By occupying less space in the mouth than the instruments in common use, it may be employed where they are inadmissible. *B*, the handle through which the screw *AC* is passed, by which the plate of iron *D* may be more or less separated from the fixed plate *E*, by turning the nut *A*. The plates *DE* should be sufficiently firm for resisting the pressure of the jaws, and they should be covered with leather or cloth to prevent the teeth from being injured.

Fig. 2. Another form of a speculum for the mouth. *GH*, two firm iron plates, which being inserted between the teeth of the upper and under jaw, may be separated to any necessary degree by turning the handle *F*. The farther extremity of the plate *G* is intended to compress the tongue, an addition which may be easily made to fig 1.

Fig. 3. The instrument in common use as a speculum oris, but it is so defective that it can seldom be used with much advantage.

## PLATE LV.

[Opposite to page 110.]

Fig. 1. Forceps for laying hold of the lip in performing the operation for the hare lip. It may be done with the fingers alone, but the parts cannot be so neatly cut in this manner as when the forceps are employed.

Fig. 2. A kind of cutting forceps, the invention of Dr. John Aitken : They may be employed either in the hare lip, or in the removal of cancerous affections of the lip : One blade of the forceps is a plane smooth surface, while the other is furnished with a sharp cutting edge. In using this instrument the two blades must be pressed against each other with one hand, with a force sufficient to divide the parts that are meant to be cut ; while the other hand is employed in securing the handles.

## PLATE LVI.

[Opposite to page 118.]

Fig. 1. Scissors of a size and strength sufficient for dividing the parts in the operation for the hare lip. It is not probable they will ever be generally employed, but I think it right to delineate a size of the instrument which by experience is found to answer.

Fig. 2. Cutting pliers for the purpose of removing small splinters of bone wherever they are met with.

## PLATE LVII.

[Opposite to page 124.]

As the treatment of the hare lip is a point of much importance, I have judged it proper to delineate the appearance of the disease, together with that of the parts in which it is seated during the different stages of the operation and cure.

Fig. 1. A case of hare lip in the upper lip. *A*, one of the incisores appearing in the centre of the opening, which ought to be removed before the operation, as a tooth in this situation is very apt to interrupt the cure. *BB*, the unequal edges of the fissure with which this affection is very commonly attended.

Fig. 2. The appearance of the parts after the edges of the fissure have been removed and the pins introduced. *CC*, the edges of the cut, which ought to be smooth, equal, and exactly of the same length on each side, so that when drawn together no inequality may be perceptible. The first pin should be inserted near to the under part of the lip, and the upper pin near to the superior point of the fissure. The pins represented in this figure are furnished with moveable steel points, so that the points may be taken away on the ligatures being applied, as is delineated in fig. 3. which exhibits the appearance of a hare lip immediately after the operation.

Fig.

Fig. 4. A lip after the cure is completed : *D*, represents the appearance of the cicatrix, which in general should be nearly a straight line.

Fig. 5. A flat pin for the operation of the hare lip. The pin itself, fig. 6. should be of gold, and the point, fig. 7. of steel.

### PLATE LVIII.

[Opposite to page 128.]

Figs. 1. 2. 3. 4. and 5. Different forms of scaling instruments for removing tartar and other extraneous matter from the teeth.

Figs. 6. and 7. Instruments that may be employed either for burning the nerve of a tooth, or for stuffing a hollow tooth with gold or lead. Fig. 8. may likewise be employed for the same purpose, but it is more frequently used for searching behind and between the teeth when there is any suspicion of a latent caries that is not readily discovered.

Fig. 9. Another instrument for stuffing carious teeth. And,

Fig. 10. A handle to which all these instruments may be fitted.

### PLATE LIX.

[Opposite to page 145.]

Fig. 1. The instrument commonly termed a Key for extracting teeth. After a variety of alterations in the form of it, the one here delineated is the best I have ever used.

In fig. 2. the instrument in common use, the claw is fixed, and can only be moved by taking out the screw by which it is connected with the instrument ; but in this it may be moved from one side to another, merely by pressing upon the nut *A*, by which the spring *B* is raised out of a notch in a wheel which is thus rendered moveable, and in which the claw is fixed. *D*, the heel of the instrument, which is here represented not only of a greater depth, but considerably longer than it

it is usually made : Of this length it is applied to a considerable extent of gums, by which the jaw is not so apt to suffer as when it is much shorter ; and of this depth it acts with more power than when of the usual form. This part of the instrument should not only be well polished, but it ought to be quickly covered with several plies of soft old linen, in order to render the pressure produced by it upon the gums as easy as possible. The handle *E* is sometimes made of iron ; but it answers better either of ivory or timber.

Fig. 3. A claw bent in such a manner, that when the heel of the instrument *D* is placed upon any part of the gums, the second or third tooth farther in the mouth may be pulled with it. This proves sometimes useful, where the gums opposite to the affected tooth are particularly tender ; and it should always be employed when it is meant to pull either of the two farthest molares of the lower jaw outwards ; for when the common instrument is used, the gums which cover the projecting part of the coronoid process of the jaw are always much lacerated.

Figs. 4. and 5. Two claws of different sizes of the ordinary form.

## PLATE LX.

[Opposite to page 152.]

Figs. 1. and 3. Two instruments much employed in different parts of Europe for extracting teeth. They do not, however, possess any advantage over the key instrument ; and they are liable to this objection, that they cannot be used where it is necessary to turn a tooth towards the inside of the mouth.

Fig. 1. *A*, The fulcrum, which ought to be well covered with soft old linen. *B*, the claw fixed to the handle *E*, by a small hole in the end of it, which receives a knob of a corresponding size at *C*, and it is retained in its situation by a moveable plate of polished iron *D*. The handle should be wood, and all the rest of the instrument of iron or steel. Fig. 2. A claw  
with

with a considerable degree of curvature, for extracting teeth at a greater depth in the mouth than the fulcrum can be placed at.

Fig. 3. *F*, the fulcrum. *E*, a straight claw fixed to the instrument by a screw at *H*. *I*, the handle, which should be of wood.

PLATE LXI.

[Opposite to page 149.]

Figs. 1. 3. and 4. Different forms of forceps for extracting teeth. Fig. 3. is perhaps the most useful of any.

Fig. 2. Small dissecting forceps employed in different operations in the mouth, as well as in other parts.

PLATE LXII.

[Opposite to page 153.]

Fig. 1. Teeth forceps with moveable claws. And, Fig. 2. A fulcrum to be used along with them, both described in page 153.

Fig. 3. An instrument for dividing the frenum linguæ, described in page 75.

PLATE LXIII.

[Opposite to page 157.]

Figs. 1. 2. and 3. Different forms of a punch or lever for extracting stumps of teeth. The method of using them is described page 157. Figs. 1. and 3. are the best. They consist of two parallel plates of polished iron, which may be separated more or less by pressing the moveable sliders *AB* higher or lower.

Figs. 4. 5. 6. and 7. Different forms of files for removing inequalities upon the teeth.

PLATE LXIV.

[Opposite to page 187.]

Figs. 1. 2. and 3. Different forms of instruments employed for concentrating sound in cases of deafness, described in page 187.

Fig.

Fig. 4. A syringe of a proper size for washing the meatus auditorius externus.

Figs. 5. and 6. Instruments for perforating the lobes of the ear, described in page 188.

#### PLATE LXV.

[Opposite to page 192.]

Figs. 1. 2. and 3. Different forms of glasses for drawing milk from the breasts of women. With figs. 1. and 3. the breast may either be sucked by the person herself, or by an assistant; and fig. 2. is a glass cup, mounted with a bag of elastic gum. *A*, the glass cup joined to the bag *C* by the intervention of a brass tube *B*. They are more particularly mentioned in page 192.

#### PLATE LXVI.

[Opposite to page 193.]

Fig. 1. An instrument mentioned in page 192, for supporting the head after the operation for the wry neck. *ABC*, a curved plate of iron fitted to the shoulder, and supporting another plate, to the top of which is connected the plate *DEF*, upon which the head is meant to rest, and which therefore should be covered with soft leather or cotton. *GHI*, a buckle and strap for fixing the instrument round the neck.

Figs. 2. 3. and 4. Different kinds of cups, which may be either of ivory, lead, or silver, for covering the nipples and protecting them from the clothes, when they are either chopped or otherwise diseased. The holes in their brims are for receiving pieces of small tape for fixing them round the body.

Fig. 5. A broad flat needle, of a lancet form, for introducing cords or setons in different parts of the body.

#### PLATE LXVII.

[Opposite to page 226.]

Figs. 1. 2. 3. and 4. are different representations of the edges of wounds drawn together, and retained by adhesive plasters, as mentioned in page 226.

## PLATE LXVIII.

[Opposite to page 268.]

The different figures in this plate represent an apparatus for the cure of a rupture of the tendo Achillis. An explanation of it is given in page 268, &c.

## PLATE LXIX.

[Opposite to page 284.]

The figure in this plate is the invention of Mr. Chabert, of Paris, and is taken from the second volume of *Memoirs of the Royal Academy of Surgery*: It is the best instrument that has yet been published for compressing the jugular veins.

It consists of two curved pieces of steel, *AA*, connected by a joint at the back part of the machine, *D*. One of the sides terminates in a horizontal plate, *B*; the teeth of which passing through a hole in the opposite plate, the pressure made with it may be increased or diminished at pleasure. The cushion, *C*, is meant to be placed upon the jugular vein, either upon a bleeding orifice in cases of hemorrhagy, or immediately below the opening to be made into it where blood is to be taken from this vein. This cushion should be moveable, so as to pass with ease from one part of the instrument to another. Every part of the machine, excepting the plate *B*, should be covered with soft leather.

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END OF VOL. III.

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